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THE SOCIALLY-EMBEDDED SUPPORT SYSTEM IN DOCTORAL EDUCATION

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The Socially-Embedded Support System in Doctoral Education

ABSTRACT

This dissertation study explored the socially-embedded support system in the learning environment of doctoral education from the perspective of supervisors in Finland and doctoral students in Finland and Denmark. The socially-embedded support system entails several levels, ranging from macro level policies often realized in the institutional policies and practices, to activities taking place in a micro level researcher community such as in a researcher team or in the supervisory relationship. In order to view the social support system provided by the doctoral education, various elements of the support system were explored based on The Researcher Community and Supervisory Support model (Pyhältö, 2018). The two primary sources of social support: supervisory support and researcher community support were explored. Also, the three forms of social support: informational, instrumental and emotional support were examined. Furthermore, the support fit, i.e. the fit between the experienced need and the experienced support received, was investigated. In addition, the interrelation between support sources, support forms and support fit and doctoral students' experiences of study satisfaction and experiences of burnout were explored. A mixed methods approach was used in the dissertation.

Part-study I focused on analysing how doctoral supervisors perceived the primary resources and challenges of doctoral studies embedded in the various levels in the nested learning environment provided by the doctoral education. Fifteen experienced Swedish-speaking PhD supervisors from three Finnish universities representing a broad range of disciplines were interviewed. The resources and challenges that the supervisors described were related to structures (organizational), to the organization of doctoral education, to the scholarly community, to the supervisory relationship, and to doctoral students' individual competence. The study showed that supervisors' perceptions of the main resources of doctoral students were related to social aspects at an individual level or to a researcher community level in doctoral education. The primary challenges of doctoral students, as perceived by supervisors, were located at an institutional level, typically associated with the structural elements of supervisory work.

Part-study II focused on doctoral students' experiences of supervisory and researcher community support, support forms, support fit and how the experiences were related to their experiences of satisfaction and experiences of burnout in their

doctoral studies. A Doctoral Experience Survey (Pyhältö et al., 2011) was utilized with reports from 248 doctoral students with Swedish as their mother tongue representing a broad range of disciplines at three research universities in Finland. The doctoral students' satisfaction with doctoral supervision was associated with having multiple sources of support and appreciation of particularly informational and emotional support received from their supervisors and the research teams. Students who received more supervision and were more satisfied with it and those who felt they were equally treated within the researcher community had a reduced risk of experiencing burnout. Experiences of burnout, in turn, were connected to students' increased attrition intentions.

Part-study III focused on advancing a cross-cultural understanding of doctoral students' experiences of support sources, forms of support and support fit in two national contexts. A total of 381 doctoral students in social science and humanities disciplines in Finland and Denmark answered a Cross-Cultural Doctoral Experience Survey (Pyhältö et al., 2015). The results showed that similarities between the social support experiences were found regarding students' emphasis on researcher community support over supervisory support. The only form in which the students in both countries underlined more matched support than mismatched support was in the form of informational support. However, the Danish students perceived more mismatched support in emotional support and the Finnish students expressed more incidents of mismatched instrumental support

This dissertation contributes to the research base by merging the Researcher Community and Supervisory Support model (Pyhältö, 2018) and the Job-Demands and Resources model (Bakker & Demerouti, 2007). The application of the merged insights of these two models contributed to simultaneous interpretation of the results, and to new understanding of the nested social support system provided by doctoral education. The experiences of the Swedish-speaking language minority of social support in supervision have not been researched to this extent before. The results of this dissertation contribute to research while it identifies that the quality and quantity of supervisory and researcher community interactions enhance positive experiences in the doctoral study process at several levels of the socially-embedded support system. The results pointed to individual and contextual variations in experiences of support fit. Moreover, this dissertation suggests that challenges related to social support in doctoral education, including the lack of or inadequate support, are associated with reduced levels of satisfaction, an increased risk of burnout, and, an increased risk of attrition.

Keywords: doctoral education, doctoral study process, support system, doctoral student, doctoral supervisor, social support, supervisory support, researcher community support, support forms, support fit, satisfaction, burnout

Solveig Cornér

Det sociala stödet i doktorsutbildningen ur ett systemperspektiv

SAMMANDRAG

Målsättningen med avhandlingen var att undersöka det sociala stödet i doktorandernas lärmiljö ur ett systemperspektiv. Två nordiska länder, Finland och Danmark, utgör kontexten för studien. På basis av doktoranders och handledares erfarenheter har olika komponenter av det sociala stödet och handledningen granskats på flera nivåer i systemet. Systemnivåerna utgörs dels av den så kallade makronivån, som omfattas av olika riktlinjer som oftast realiseras på universitetsnivå eller i verksamhetens praxis, och dels av den så kallade mikronivån som innefattar forskningsgrupper och den individuella relationen mellan handledare och doktorand. I undersökningen av det sociala stödet i doktorandernas lärmiljö ur ett systemperspektiv har den teoretiska modellen "The Researcher Community and Supervisory Support" (Pyhältö, 2018) fungerat som grund. I granskningen av det sociala stödet har modellen använts med utgångspunkt i vem eller vilka som ger stöd, det vill säga antingen den enskilde handledaren eller den akademiska gemenskapen. En annan utgångspunkt har varit olika slags stödformer; informativt stöd, instrumentellt stöd eller emotionellt stöd. I studien har också undersökts hur väl det tillgängliga stödet motsvarar det upplevda behovet. Därtill har kopplingen mellan doktorandernas erfarenheter av att få socialt stöd och handledning och deras upplevelser av hur nöjda de är med sin utbildning, samt deras upplevelser av utbrändhet undersökts. I studien har använts både kvalitativa och kvantitativa metoder (mixed methods).

Delstudie I fokuserade på hur handledare upplevde de centrala faktorer som påverkar doktorsutbildningen. Inom studien gjordes 15 intervjuer med svenskspråkiga professorer inom olika discipliner, vid tre forskningsintensiva universitet i Finland. Målet var att fånga upp handledarnas uppfattningar om primära resurser och utmaningar i doktorsutbildningen, samt på vilken organisatorisk nivå handledarna identifierade de primära resurserna och utmaningarna. Resultaten visade att handledarnas beskrivningar av resurser och utmaningar kunde kopplas till organisatoriska strukturer, till hur doktorsutbildningen var organiserad, till den akademiska gemenskapen, till relationen mellan handledare och doktorander och till doktorandernas individuella kompetenser. Majoriteten av de resurser som handledarna beskrev var kopplade till sociala aspekter i doktorsutbildningen, till den akademiska gemenskapen och till relationen mellan handledare och doktorander. De utmaningar som identifierades av handledarna var relaterade till den institutionella nivån, till exempel att strukturen på doktorsutbildningen uppfattades som bristfällig.

Delstudie II fokuserade på hur doktoranderna upplever de olika aspekterna av handledningen, det vill säga vem de får handledning av, olika former av handledning och ifall doktoranderna upplever att den typ av handledning som funnits tillgänglig tillfredsställer deras behov. I delstudien granskades även hur dessa aspekter av handledningen kan relateras till hur nöjda doktoranderna upplever att de är med doktorsutbildningen och deras upplevelse av utbrändhet i studierna. Studien genomfördes som en enkätundersökning, The Doctoral Experience Survey (Pyhältö et al., 2011). Enkäten besvarades av 248 finländska doktorander med svenska som modersmål. De representerade olika vetenskapsområden vid tre forskningsintensiva universitet i Finland. Resultaten visade att de respondenter som har varit nöjda med handledningen upplevde att de fått handledning av både sina handledare och den akademiska gemenskapen. De doktorander som var nöjda med handledningen hade fått socialt stöd i form av specifika råd och respons på sin forskning och även emotionellt stöd i form av till exempel konstruktiv handledning. De doktorander som upplevde att de fått mer handledning och var nöjda med handledningen, och de doktorander som rapporterade att de känner sig jämlikt behandlade i den akademiska gemenskapen hade generellt sett en mindre risk för att känna sig utbrända. Resultatet visade också att doktoranderna i en högre grad funderade på att avbryta sina studier om de upplevde att de var utbrända.

Delstudie III var en jämförelsestudie. I studien granskades finländska och danska doktoranders erfarenheter av det sociala stödet i den akademiska gemenskapen och i relationen mellan handledaren och doktoranden, olika slags stödformer och hur väl det tillgängliga stödet motsvarar det upplevda behovet. I den sista delstudien jämfördes sammanlagt 381 finländska och danska doktorander, som representerade samhällsvetenskap och humaniora vid ett universitet i Danmark och vid två universitet i Finland. Resultaten baserar sig på både kvantitativt och kvalitativt analyserad data, som samlades in genom enkäten The Cross-Cultural Doctoral Experience Survey (Pyhältö et al., 2015). Resultaten visade både likheter och skillnader mellan finländska och danska doktorandernas upplevelse av handledningen. Doktoranderna uppskattade stödet från den akademiska gemenskapen högre än det individuella stödet. Information i anknytning till forskningen var den enda stödform som både finländska och danska doktorander ansåg att motsvarar deras upplevda behov. De danska doktoranderna poängterade att formen av emotionellt stöd inte var tillräckligt medan de finländska doktoranderna upplevde att det instrumentella stödet var otillräckligt.

Den här avhandlingen bidrar till forskningslitteraturen genom att den sammanfogar de två teoretiska modellerna Researcher Community and Supervisory Support-modellen (Pyhältö, 2018) och Job-Demands and Resources-modellen (Bakker & Demerouti, 2007) och granskar hur det sociala stödet uppfattas i doktorsutbildningen genom dessa två perspektiv samtidigt. Forskningen lyfter också fram en språkminoritet som tidigare inte undersökts ur detta perspektiv,

det vill säga svenskspråkiga handledare och doktorander i Finland och deras uppfattningar om socialt stöd ur ett system-perspektiv. Resultaten av forskningen visar att kvaliteten och frekvensen av den sociala interaktionen i systemet bidrar till positiva erfarenheter på flera olika nivåer i doktorsutbildningen. Resultaten visar både individuella och kulturella skillnader gällande hur väl det tillgängliga stödet motsvarar det upplevda behovet. Resultaten visar även att doktorandernas utmaningar när det gäller hur de upplever det sociala stödet (inklusive uteblivet och otillräckligt stöd) kan kopplas till upplevelser av utbrändhet, missnöje med handledningen och risk för att doktoranderna avbryter sina studier.

Nyckelord: doktorsutbildning, doktorandstudier, stödsystem, doktorand, handledare, socialt stöd, handledarrelation, stöd inom den akademiska gemenskapen, stödform, stödbehov, tillfredsställelse av stöd, utbrändhet.

Solveig Cornér

Sosiaalinen tukijärjestelmä tohtorikoulutuksessa

TIIVISTELMÄ

Tämän tutkimuksen tavoitteena on tarkastella sosiaalista tukea tohtorikoulutettavien oppimisympäristössä systeemijattelun näkökulmasta. Tutkimuskontekstin muodostaa kaksi pohjoismaata, Suomi ja Tanska. Sosiaalisen tuen ja ohjaamisen eri tekijöitä tutkitaan tohtorikoulutettavien ja ohjaajien kokemusten pohjalta useilla systeemisillä tasoilla. Systeemisiet tasot muodostuvat toisaalta niin sanotusta makrotasosta, joka käsittää erilaisia käytänteitä, jotka toteutuvat useimmiten yliopistotasolla tai yleensä toimintatavoissa. Toisaalta taas systeemisiet tasot muodostuvat niin sanotusta mikrotasosta, joka tarkoittaa tässä tutkimusryhmiä ja yksittäistä ohjaajan ja tohtorikoulutettavan välistä suhdetta. Tarkastelun pohjana on teoreettinen malli ”The Researcher Community and Supervisory Support Model” (Pyhälto, 2018). Sosiaalisen tuen tarkastelussa lähtökohtana on ollut se, kuka tai ketkä antavat tukea: yksittäinen ohjaaja vai akateeminen yhteisö. Toisena lähtökohtana ovat olleet erilaiset tukimuodot, kuten informatiivinen tuki, välineellinen tuki ja emotionaalinen tuki. Lisäksi tutkitaan sitä, miten hyvin saatavissa oleva tuki vastaa koettua tuen tarvetta. Lisäksi tarkastellaan sitä, miten tohtorikoulutettavien kokemukset sosiaalisen tuen ja ohjauksen saannista ja tyytyväisyys koulutukseen sekä uupumuksen kokemukset kytkeytyvät toisiinsa. Tutkimuksessa on käytetty sekä laadullisia että määrällisiä menetelmiä (mixed methods).

Osatutkimus I keskittyi siihen, miten ohjaajat kokivat keskeiset tohtorikoulutukseen vaikuttavat tekijät. Tutkimuksessa haastateltiin 15 ruotsinkielistä professoria eri aloilta kolmessa suomalaisessa tutkimusyliopistossa. Tavoitteena oli selvittää ohjaajien käsityksiä tohtorikoulutuksen ensisijaisista resursseista ja haasteista sekä sitä, millaisella organisatorisella tasolla ohjaajat tunnistivat nämä resurssit ja haasteet. Tulosten mukaan ohjaajien kuvaukset resursseista ja haasteista liittyivät järjestelmän rakenteisiin, akateemiseen yhteisöön, ohjaajien ja tohtorikoulutettavien väliseen suhteeseen, tohtorikoulutettavien henkilökohtaiseen kompetenssiin ja siihen, miten tohtorikoulutus on järjestetty. Suurin osa ohjaajien kuvaamista resursseista kytkeytyi tohtorikoulutuksen sosiaalisiin näkökulmiin, akateemiseen yhteisöön ja ohjaajien ja tohtorikoulutettavien väliseen suhteeseen. Ohjaajien tunnistamat haasteet liittyivät puolestaan institutionaaliseen tasoon, esimerkiksi tohtorikoulutuksen rakennetta pidettiin puutteellisena.

Osatutkimus II selvitti sitä, miten tohtorikoulutettavat kokevat ohjauksen eri osatekijät: ohjaajan, ohjaamisen muodot ja sen, vastaako saatavilla ollut

ohjaus heidän tarpeitaan. Lisäksi tutkittiin sitä, miten ohjaamisen osatekijät suhteutuivat tohtorikoulutettavien tyytyväisyyteen tohtorikoulutukseen ja opiskelu-uupumukseen. Tutkimus toteutettiin ”The Doctoral Experience Surveyn” -kyselytutkimuksella (Pyhältö ym., 2011). Kyselyyn vastasi 248 suomalaista tohtorikoulutettavaa, joiden äidinkieli on ruotsi. He edustivat eri tieteenaloja kolmessa suomalaisessa tutkimusyliopistossa. Tulokset osoittivat, että ne vastaajat, jotka olivat tyytyväisiä ohjaukseen, kokivat saaneensa ohjausta sekä ohjaajiltaan että akateemiselta yhteisöltä. Ohjaukseen tyytyväiset tohtorikoulutettavat olivat saaneet sosiaalista tukea täsmällisten ohjeitten ja rohkaisun muodossa ja emotionaalista tukea esimerkiksi konstruktiivisen ohjauksen muodossa. Ne tohtorikoulutettavat, jotka tunsivat saaneensa enemmän ohjausta ja olivat tyytyväisiä siihen, sekä ne, jotka raportoivat tulleen yhdenvertaisesti kohdelluiksi akateemisessa yhteisössä, kokivat vähemmän uupumusta. Tutkimus osoitti myös, että itsensä uupuneiksi tuntevat tohtorikoulutettavat myös harkitsivat useammin opintojensa keskeyttämistä.

Osatutkimus III on vertaileva tutkimus, jossa tarkasteltiin suomalaisten ja tanskalaisten tohtorikoulutettavien kokemuksia sosiaalisesta tuesta akateemisessa yhteisössä ja ohjaussuhteessa. Lisäksi selvitettiin erilaisia tukimuotoja ja sitä, miten hyvin saatavilla oleva tuki vastaa koettua tuen tarvetta. Tässä viimeisessä osatutkimuksessa vertailtiin suomalaisia ja tanskalaisia tohtoriopiskelijoita, joita oli yhteensä 381. He edustivat yhteiskuntatieteitä ja humanistisia tieteitä yhdessä tanskalaisessa ja kahdessa suomalaisessa yliopistossa. Tulokset pohjautuvat sekä määrällisesti että laadullisesti analysoituun aineistoon, joka kerättiin kyselyllä ”The Cross-Cultural Doctoral Experience Survey” (Pyhältö ym., 2015). Tulokset osoittivat niin yhtäläisyyksiä kuin eroavaisuuksia siinä, miten suomalaiset ja tanskalaiset tohtorikoulutettavat kokivat ohjauksen. Tohtorikoulutettavat arvostivat akateemisen yhteisön tukea enemmän kuin henkilökohtaista tukea. Informatiivinen tuki eli spesifisten tietojen kytkeminen tutkimukseen oli ainoa tukimuoto, joka sekä suomalaisten että tanskalaisten tohtorikoulutettavien mielestä vastasi heidän kokemaansa tarvetta. Tanskalaiset tohtorikoulutettavat tähdensivät, että emotionaalinen tuki ei ollut riittävää, kun taas suomalaiset tohtorikoulutettavat kokivat, että välineellinen tuki oli riittämätöntä.

Tämä väitöskirja antaa panoksensa alan tutkimuskeskusteluun yhdistämällä kaksi teoreettista mallia: Researcher Community and Supervisory Support -mallin (Pyhältö, 2018) ja Job-Demands and Resources -mallin (Bakker & Demerouti, 2007). Näihin teoreettisiin malleihin perustuvat analysoidut tulokset edistävät ymmärrystä siitä, miten sosiaalinen tuki käsitetään tohtorikoulutuksessa systeemisestä näkökulmasta. Samalla tutkimus nostaa esiin kielivähemmistön, toisin sanoen ruotsinkieliset ohjaajat ja tohtorikoulutettavat Suomessa. Väitöstudiumin tulokset osoittavat, että sosiaalisen vuorovaikutuksen laatu ja yleisyys ovat kytköksissä positiivisiin kokemuksiin tohtorikoulutuksen useilla eri tasoilla. Tutkimus osoitti, että saatavilla olevassa tuessa ja koetussa tuen tarpeessa on sekä yksilöllisiä että kulttuurisia

eroja. Lisäksi tutkimuksessa kävi ilmi, että tohtorikoulutettavien haasteet, jotka liittyvät sosiaaliseen tukeen (mukaan lukien puuttuva tai riittämätön tuki), ovat sidoksissa uupumuksen kokemuksiin, tyytymättömyyteen ohjaussuhteessa ja riskiin keskeyttää opinnot.

Avainsanat: tohtorikoulutus, tohtoriopinnot, tukijärjestelmä, tohtorikoulutettava, ohjaaja, sosiaalinen tuki, ohjaussuhde, akateemisen yhteisön tuki, tukimuoto, tuen tarve, tyytyväisyys tukeen, uupumus.

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At home, in Långvik, Kirkkonummi, 2.2.2020

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LIST OF ORIGINAL PUBLICATIONS

This dissertation is based on the following three publications, which are referred to in the text by their Roman numerals (Part-studies I–III)

Cornér, S., Pyhältö, K., & Löfström, E. (2019). Doctoral supervisors' conceptions on primary resources and challenges on the doctoral journey. *International Journal of Teaching and Learning in Higher Education*, 31(3), 365–377.

Cornér, S., Löfström, E., & Pyhältö K. (2017). The relationship between doctoral students' experiences of supervision and burnout. *International Journal of Doctoral Studies*, 12, 91–106.

Cornér, S., Pyhältö, K., Peltonen, J., & Bengtsen, S. (2018). Similar or different? Comparison on researcher community and supervisory support experiences among Finnish and Danish Social Sciences and Humanities PhD. Students. *Studies in Graduate and Postgraduate Education*, 9(2), 274–295.

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1. INTRODUCTION

Doctoral education provides a nested socially embedded learning environment for the doctoral students. Quantity and the quality of various interactions within the doctoral journey play a major role in doctoral experience and related outcomes (Ives & Rowley, 2005; Pyhältö, Vekkaila, & Keskinen, 2015; Pyhältö, 2018; Zhao, Golde & McCormick, 2007).

Within these interactions, doctoral students learn about research and how to create new knowledge, but they also learn about the practices of their research communities, and how to engage in these practices during their doctoral studies (Stubb, 2012). Accordingly, the key regulator of doctoral student learning is the interactions they engage with in their learning environments during their studies (Stubb, 2012). In particular, the social support received from supervisors (Gurr, 2001; Kobayashi, 2014; Olmos-López & Sutherland, 2015; Vehviläinen & Löfström, 2014; Wisker & Claesson, 2013; Åkerlind & McAlpine, 2015) and research communities plays a major role in the doctoral experience, researcher development and study completion (Agné & Mörkenstam, 2018; Dysthe, Samara, & Westrheim, 2006; Lee, 2018; Malfroy, 2005; Peltonen, Vekkaila, Haverinen, Rautio, & Pyhältö, 2017; Rigg, Day, & Adler, 2013; Skakni, 2018a). In turn, lack of such support has been shown to increase feelings of isolation, loneliness and stress that have been associated with increased risk of attrition (Jairam & Kahl, 2012; Pyhältö, Stubb & Lonka, 2009; Stubb, Pyhältö, & Lonka, 2011; Vekkaila, Virtanen, Taina, & Pyhältö, 2016). Unfortunately, doctoral students quite commonly report such experiences. Moreover, a significant number of doctoral students never complete their doctoral degrees (Jones, 2013; Gardner, 2009). Attrition rates can be as high as 70% (with a range from 33% to 70%) (Gardner & Gopaul, 2012; Ivankova & Stick, 2007; Jiranek, 2010). Yet, social support can engage students in collaborative knowledge construction and ease emotional exhaustion (Malfroy, 2005; Pyhältö et al., 2009; Sala-Bubaré & Castelló, 2017; Vekkaila, Pyhältö, Hakkarainen, Keskinen, & Lonka, 2012) by providing a counter force to isolation and experiences of stress (Jones, 2013).

Adequate researcher community support is shown to promote PhD completion and positive doctoral experiences (Martinsuo & Turkulainen, 2011; Max Planck Society, 2017; Pyhältö, Vekkaila & Keskinen, 2012; Pyhältö, Vekkaila & Keskinen, 2015). Moreover, supervisory support at all levels in the social support system fosters both the advancement of the doctoral research and the doctoral student's overall development in becoming an excellent academic expert (Gurr, 2001). This implies that the quality and the quantity of social support is a central determinant of the doctoral journey (Barnes, Williams, & Archer, 2010; Jones, 2013; Halse & Malfroy,

2010; McAlpine & Amundsen, 2012). Despite a significant body of evidence on the importance of supervisory and researcher community interactions for the doctoral experience, our understanding of the complexity of social support offered by the socially-nested learning environment of doctoral education is still fragmented. This research will focus on bridging the gap by exploring the socially-nested support system in the learning environment of doctoral education. This doctoral dissertation will examine various sources of support, different forms of support, and the support fit (that is, whether the support received is matched or mismatched). Moreover, the interrelation between the complementary elements of social support and doctoral students' study satisfaction and experiences of burnout will be explored.

This research contributes with knowledge of how the support system provided by the socially- embedded learning environment plays a central role in doctoral education. The results of this dissertation can be utilized in developing more powerful social support systems for doctoral students at their institutions, in their research communities and in supervisory relationships from the perspective of the doctoral students and the supervision they receive as well as in national and international contexts.

2. THEORETICAL FRAME

2.1 DOCTORAL EDUCATION AS A SOCIALLY-EMBEDDED NESTED SYSTEM

Doctoral education provides a highly socially-embedded nested learning environment for doctoral students (McAlpine & Norton, 2006; McAlpine & Åkerlind, 2010). Doctoral students engage within this nested system (Bronfenbrenner, 1979) at several levels, ranging from the macro level policies often realized in institutional policies and practices, to the activities provided by a micro level researcher community such as in a researcher team or a seminar. They also engage in the supervisory relationship that is embedded in the broader socio-cultural context of the scholarly community. Students can participate within the practices provided by the nested learning environments in several ways. They can adapt, adopt, ignore or oppose the practices, depending on their personal preferences.

Doctoral students' learning is embedded in the interaction at each level of the system, influencing them in various ways (Lovitts, 2005). A vital part in the doctoral student learning is enculturation into the practices at the beginning of their studies. For instance, enculturation takes place when the student receives social support, such as individual supervision (Golde, 1998) or when they are introduced to the research team for the first time. In addition, the development of doctoral students' professional agency depends largely on the social structures that the doctoral student is engaged with. The social support they receive during their studies contributes to their overall development as a scholar (Gurr, 2001; Stubb, 2012; Åkerlind & McAlpine, 2015). In fact, prior research suggests that social support plays a central role in the quality of the overall doctoral experience and the study progress (Ali & Kohun, 2006; Gardner, 2007, 2008; Jairam & Kahl, 2012; Martinsuo & Turkulainen, 2011; Zhao et al., 2007; Weidman & Stein, 2003).

Both international and national policies and drivers of doctoral education, such as EU policies, legal acts' and regulations stipulated in the national law, influence the doctoral experience through institutional practices and policies of doctoral education (Bengtson, 2016b; McAlpine & Norton, 2006; Wisker & Robinson, 2012; Wisker, Robinson, & Bengtson, 2017). During past decades changes in such policies, including the demand for higher number of PhD graduates, decreases in funding and quality assurance reflected at the *institutional level* in the massification of doctoral education and in more structured doctoral programs (McAlpine, 2017; McCallin & Nayar, 2012). However, the institutional setting is important because doctoral students' educational experiences and learning is embedded in affordances and restrictions provided by their institution. This includes both formal doctoral

education and a range of support services and practices organized by the institution (Elliot, Baumfield, & Reid, 2016). Moreover, the institutional context embodies the guidelines and structures of doctoral education, such as supervisory practices (Strandler, Johansson, Wisker, & Claesson, 2014) that are put into practice at the institutional level. Accordingly, the socio-cultural institutional structures with its norms affect all doctoral students (Lovitts, 2005). However, support structures provided by the institution are seldom optimal (Ali & Kohun, 2006; Gardner, 2008; Lovitts, 2001; Pyhältö & Keskinen, 2012). There is evidence that doctoral students can feel alienated and become lost in the Graduate School system and that there is the risk that they may feel like outsiders to the institution (Bengtsen, 2016b; Barnett & Bengtsen, 2017; Wisker & Robinson, 2012). This implies that the institutional support in terms of the opportunity to become integrated into their research environment is vital to degree completion (Castelló, Pardo, Sala-Bubaré, & Suñe-Soler, 2017; Graham & Massyn, 2019; Jairam & Kahl, 2012; Lovitts, 2001).

When launching their doctoral studies, a doctoral student becomes a member of a community such as a department, but also of a number of other kinds of communities (Stubb, 2012). Within institutions, there are *micro level communities* such as *research teams*, with the social networks and social relationships that play a substantial role in the doctoral study process. The research team constitutes the disciplinary community of practice (Stubb, 2012; White & Nonnamaker, 2008). The team may be comprised of networks for research seminars and interaction with individuals beyond the institution (Nummenmaa, Pyhältö, & Soini, 2008). The research team influences the doctoral experience in several ways. Firstly, the research team enhances enculturation into the discipline (Dysthe et al., 2006; Öberg, 2016). Secondly, the research team offers feedback to the doctoral student (Pyhältö & Keskinen, 2012; Pyhältö, et al., 2015). The research teams provide an arena for support, but the support experiences vary between students. Thirdly, it has been shown that collective supervisory practices (such as through research seminars with the research team) offer a broader holistic support network for both the student and the supervisors in the research team (Dysthe et al., 2006; Hakkarainen, Hytönen, Makkonen, & Lehtinen, 2016; Stubb, 2012).

Within the micro level communities there are several relationships, one of the most significant being that between a doctoral student and their supervisor. *The student and supervisor relationship* is situated at the centre of doctoral education, contributing to the individual doctoral experience. The relationship is also influenced by regulation and the requirements of the institution, such as supervisory contracts (Olmos-López & Sutherland, 2015). At best, the supervisory relationship fosters the growth of the doctoral research and the doctoral student's development as a scholar in a long term (Gurr, 2001). Supervisors provide their expertise and feedback to doctoral students and learning opportunities within the researcher community (Pearson & Brew, 2002; Pyhältö & Keskinen, 2012; Vekkaila, 2014).

Doctoral students need several kinds of support during their doctoral studies in order to overcome the multiple challenges faced during that period of study. This calls for alertness and sensitivity to the needs of the students from the supervisor (Gurr, 2001). A constructive supervisory relationship, frequent meetings, a relaxed ambience during meetings, and a sympathetic and caring attitude towards the supervisee, are associated with good progress and satisfaction with doctoral studies (Hermann, Wichmann-Hansen, & Jensen, 2014; Ives & Rowley, 2005; Pyhältö et al., 2012a, 2015; Zhao et al., 2007). The supervisor – student relationship is perceived as a highly influential determinant in doctoral education (Hunter & Divine, 2016; Ives & Rowley, 2005; Martinsuo & Turkulainen, 2011; Pyhältö et al., 2012c; Zhao et al., 2007).

Success in earning a doctoral degree also requires a strong commitment from *individual doctoral students* to their doctoral studies. This includes investing effort and financial resources and time to develop to become an academic expert. At the same time, contemporary doctoral students face a more competitive research-driven environment than earlier generations (Bengtson, 2016b; Deuchar, 2008; McAlpine, 2017). This includes the higher number of doctoral students competing for fewer financial resources in research (McAlpine, 2017; McCallin & Nayar, 2012). They also need to develop new technological skills, language competence and use modern equipment, and develop “*an academic profile equal to what was expected for tenures 15-20 years ago*” (McAlpine, 2017, page 68). How individual doctoral students tackle the challenges and perform during their doctoral studies differs, partly depending on their background and their personal motives for undertaking their study (Martinsuo & Turkulainen, 2011; Nummenmaa et al., 2008). For instance, the cultural diversity of doctoral students has increased, and higher numbers of doctoral students are studying abroad (McAlpine, 2017; Olmos-López & Sutherland, 2015). Further, students vary in terms of their study status, and do not always undertake their studies on a full-time basis (Castello et al., 2017) and also the forms of dissertation vary (e.g. article-based or monograph), depending much on the national and disciplinary context (Hakkarainen et al., 2016). Moreover, the degree of agency displayed by an individual student can vary according to the phase of their studies, their personal preferences, the opportunities provided by the learning environment and depending on the situation and task at hand, as well as individual differences (Golde, 2005; Hoopwood, 2010; Martinsuo & Turkulainen, 2011; Strandler et al., 2014). The interplays between the social support the individual student receives, and student-related attributes determine how the student copes with the challenges presented by their doctoral studies.

The several levels in doctoral education: the policy level, the institutional level, the research team level, the supervisor – student level and the individual doctoral student level, constitute a hierarchic and interactive socially-embedded nested system.

Resources provided and challenges presented by the nested social support of doctoral education

Resources and challenges in doctoral education are located at different levels in the socially-embedded nested system provided by the doctoral education. Recognizing and making use of resources provided by this system is important, because resources enable the achievement of goals and stimulate doctoral student growth and development (Pyhältö et al., 2009; 2015, Vekkaila, 2014; Vekkaila et al., 2016). However, it is equally important to identify and buffer the challenges that occur in the socially-embedded nested system. The challenges may hinder doctoral students from succeeding in their doctoral studies, while the resources may help them to overcome the challenges. Doctoral supervisors play a key role in helping the students to make the best use of the resource and to overcome the challenges.

Prior research has shown that the supervisors attribute the main challenges in doctoral studies into the institutional context. For example, the supervisors perceive heavy bureaucracy, financial insecurity and need to apply constantly for funding as core challenges in the doctoral journey (Jones, 2013; Pyhältö et al., 2012c). In turn, appropriate recruitment practices, financial security and proper research facilities are perceived as core assets (Pyhältö et al., 2012c, 2015). Supervisors were found to perceive organizing and managing the research process as a challenging task, particularly if a student is left alone to cope with it (Vehviläinen & Löfström, 2014). In overcoming such an intellectual challenge, supervisors perceived sufficient funding (Gardner, 2009; Pyhältö et al., 2012b) and the doctoral student's competence (such as theoretical understanding, specific research abilities and a professional attitude) to be core resources (Barnes & Austin, 2009). Moreover, it has been pointed out by supervisors that peers, the researcher community, extended international communities and collaborative supervisory practices are significant resources (Pyhältö et al., 2012b; Pyhältö et al., 2015; Vekkaila et al., 2016). For example, in-house and external collaborative support from various networks and a cooperative environment are as perceived as assets (Dysthe et al., 2006; Hakkarainen et al., 2016; Pyhältö et al., 2012b; Stubb, 2012). Accordingly, supervisors tend to recognize the importance of social support at the micro level, in the researcher community and supervisory activities at the supervisor – student level as a core resource in doctoral studies (Barnes & Austin, 2009; Gardner, 2007; Golde, 2005; Hopwood, 2010; Ives & Rowley, 2005; Jones, 2013; Lee, 2018; Stubb et al., 2011; Vekkaila, 2014; Vekkaila et al., 2016; Wisker & Robinson, 2012).

Yet evidence also shows that supervisors and doctoral students place different emphases on the main resources and challenges involved in undertaking doctoral studies (Pyhältö et al., 2012c; 2015). To begin with, doctoral students highlight partly different sources of support (Dysthe et al., 2006). Secondly, doctoral students and doctoral supervisors have different perceptions and expectations about different

and more specialized forms of support (Gardner, 2009; Pyhältö et al., 2012c; 2015; Vekkaila et al., 2016). While doctoral students often expect constructive feedback and encouragement from their supervisors and the opportunity to work in a research group, the supervisors note regularity in supervision as being most important of the supervisory activities (Pyhältö et al., 2012c). Accordingly, the research literature indicates that supervisors and doctoral students do not necessarily experience the key resources and challenges of the doctoral experience in the same way. Prior research implies that overcoming challenges and utilizing resources calls for adopting a systemic stance in developing doctoral education i.e. aligned development at all levels of the socially-embedded nested system of doctoral education.

2.2. THE FUNCTION OF SOCIAL SUPPORT IN DOCTORAL STUDIES

The nested multilevel learning environment provided by doctoral education constitutes the primary social support system for the doctoral student. *Social support* is comprised of the social resources (Cobb, 1976; House, 1981) perceived to be available and provided to doctoral students by the learning environment. Social support typically covers resources such as supervision (teams), mentoring schemes, feedback systems, and peer groups - by their institutional and educational environment. The learning environment provided by the doctoral education includes both formal and informal relationships within the researcher community, with peers, supervisors and other staff members (Bengtson, 2016a; Pyhältö, McAlpine, Peltonen, & Castello, 2017; Vekkaila et al., 2016). The formal relationships comprise research groups and seminars, as well peers and study groups (Hasrati, 2005; Lahenius, 2013; Vekkaila, 2014). Informal support mechanisms in doctoral education, such as supervisors, translators, peers, close friends and family have also been emphasized as important in the journey towards the doctorate (Bengtson, 2016b; Barnett & Bengtson, 2017; Bryan & Guccione, 2018; Elliot et al., 2016; Wao & Onwuegbuzie, 2011). The immediate support of good friends and close family provide a significant source of support in doctoral studies (Chen, McAlpine & Amundsen, 2015; McAlpine & Amundsen, 2012; Wisker et al., 2017). These formal and informal relationships are based on shared values; interests, common goals and solving challenges together (Lahenius, 2013). Social support during doctoral studies has been found to contribute to enculturation (Dysthe et al., 2006; Lee, 2008), to the time taken to complete the degree (Wao & Onwuegbuzie, 2011), to the completion of the doctoral studies (Hlebec Kogovšek, & Ferligoj, 2011; Leijen, Lepp & Remmik, 2015; Lovitts, 2001; Pyhältö et al., 2015), and to experiencing wellbeing during the doctoral studies (Hunter & Divine, 2016; Ives & Rowley, 2005; Lee, 2007, 2008; Peltonen et al., 2017; Pyhältö et al., 2009; Schmidt & Hanson,

2018). Further, it has been shown that a constructive supervisory relationship is associated with students' progress in their doctoral studies (Bengtson, 2016a; Ives & Rowley, 2005; Pyhältö et al., 2017; Vekkaila et al., 2016).

The researcher community and supervisory support model (Pyhältö, 2018) has been utilized in this study in exploring the socially-embedded nested system provided by the doctoral education. The model distinguishes between four complementary components of supervisory and researcher community support within academia. The components are *support sources*, *support forms*, *support fit* and *support dynamics*, each of the components consisting of different dimensions. The model is based on empirical evidence and provides both a conceptual frame for illustrating the socially-embedded doctoral student experience, and a tool for exploring the dynamics of researcher community and supervisory interaction (Pyhältö, 2018). This research focuses on three of these four components, namely; 1) different sources of support, 2) the characteristics between different forms of support (informational, emotional, instrumental) and 3) the support fit referring to match or mismatch between the support needed and received (see Figure 1).

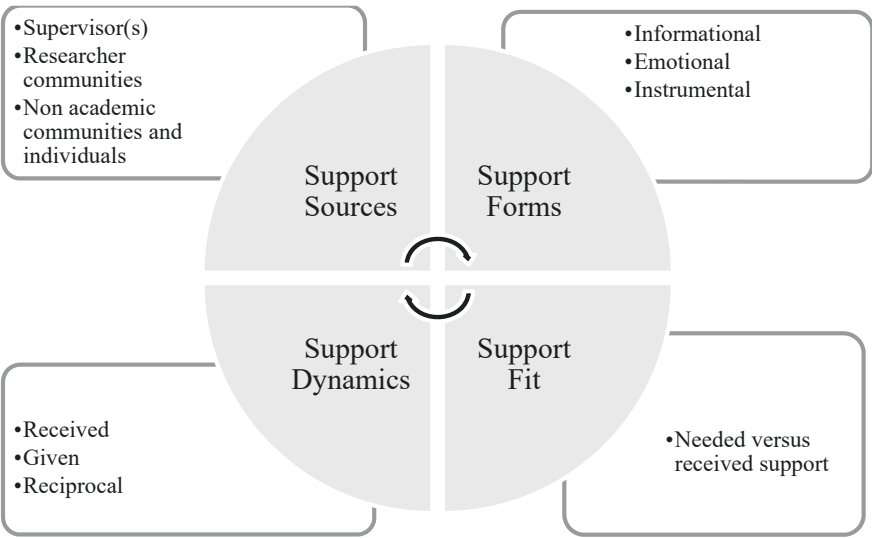


Figure 1. The Researcher Community and Supervisory Support model (Pyhältö, 2018)

2.2.1 SOURCES OF SOCIAL SUPPORT

Two primary sources of social support are well known in the doctoral experience literature. One of them is *the dyadic relationship between doctoral supervisors and doctoral students*, and the other is *the researcher community*. It has been suggested that the dyadic-supervisor relationship in the doctoral study process is

the most frequently used form of supervision (Agné & Mörkenstam, 2018), though it is important to bear in mind that disciplinary differences in supervisory practices occur (Hermann et al., 2014; Stubb, 2012). In fact, based on a recent literature review, 15% of the research on doctoral studies has focused on exploring this dyadic relationship (Jones, 2013). The supervisor-supervisee relationships can be analysed in terms of the master/apprentice model and dyadic communication (Gurr 2001; Kobayashi, 2014; Olmos-López & Sunderland, 2015; Vehviläinen & Löfström, 2014; Wisker & Claesson, 2013). In such relationships, the supervisor provides the primary and sometimes the only source of support to the doctoral student. The importance of the well-functioning supervisor-supervisee relationship for a positive doctoral experience has been emphasized in several studies (Deuchar, 2008; Devos, Van der Linden, Boudrenghien, Azzi, Frenay, Galand & Klein, 2015; Gatfield, 2005; Golde, 2005; Gurr 2001; Jones, 2013; Lee, 2008; Kobayashi, 2014; Olmos-López & Sutherland, 2015; Orellana, Darder, Pérez & Salinas, 2016; Strandler et al., 2014; Wisker & Claesson, 2013; Wisker, 2012; Zhao et al., 2007).

The supervisor also plays the core role in the enculturation of the student to the practices of the researcher community (Dysthe et al., 2006; Martinsuo & Turkulainen, 2011), much of which takes place within the supervisory relationship. They also offer their expertise to the doctoral student to draw on and provide access to various instrumental resources such as equipment and facilities (Pearson & Brew, 2002). The role of the supervisor can vary depending on the supervisor and the study phase ranging from project manager, to coach and mentor (Strandler et al., 2014). However, the doctoral student-supervisor relationship is always asymmetrical (Dysthe et al., 2006; Kobayashi, 2014) due the difference in knowledge and experience between the student and the supervisor.

Co-supervision including two or three supervisors forming a supervisory team has become a more common arrangement in doctoral supervision (Agné & Mörkenstam, 2018; Dysthe et al., 2016; Johansen, Olsen, Øverby, Garred, & Enoksen, 2019; Olmos-López & Sutherland, 2015). In co-supervision the number of support sources increases for the doctoral student, because the supervisory team provides a wider pool of support to draw on. Co-supervision is suggested to be useful for the supervisors since it provides an option to share responsibility and peer support. However, co-supervision can also cause friction, for example, if roles and responsibilities are not negotiated between the supervisors (Johansen et al. 2019; Löfström & Pyhältö, 2015; Pyhältö & Keskinen, 2012).

The researcher community, including both formal and informal relationships is another primary source of support for the doctoral student (Pyhältö et al., 2017; Pyhältö, 2018; Vekkaila et al., 2016; Wisker, 2012). The formally established networks of institutional support can range from a doctoral school or a doctoral program, to a research group, depending on the institutional and national contexts (Wisker, 2012). A research group typically comprises a combination of doctoral students,

post-doctoral researchers to more senior researchers, such as professors. Informal relationships may also include other doctoral students, post PhD researchers and other staff members (Pyhältö, 2018; Vekkaila et al., 2016). International researcher networks, special interest groups and external stakeholders (such as funding agencies and cultural foundations) also provide important sources of support (Pyhältö, 2018; Pyhältö et al., 2017). Doctoral students are often engaged in several researcher communities that complement each other. The students are perhaps central actors in some communities, but in other communities they participate less often (Stubb, 2012). Doctoral students have been shown to appreciate multiple sources of support and more collaborative knowledge sharing environments (Dysthe et al., 2006; Malfroy, 2005; Olmos-López & Sutherland, 2015; Pyhältö et al., 2009, 2012c; Vekkaila, Pyhältö, & Lonka, 2013). Yet, the importance of each community may vary at different phases of the study process (White & Nonnamaker, 2008). The research team-based supervision is particularly common in the applied sciences such as medicine or biosciences (Chiang, 2003; Pyhältö et al., 2009; Vekkaila, Virtanen, Kukkola, Frick, & Pyhältö, 2019).

The supervisors and researcher communities have partly different functions as sources of social support (Pyhältö, 2018). Both sources have strengths and weaknesses. At its best, supervisors can provide highly individualized personal attention, guidance and advice (Agne & Mörkenstam, 2018; Dysthe et al., 2006). The personal relationship between the supervisor and the supervisee also plays a crucial role in strengthening participation in the immediate researcher community e.g. inclusion of the doctoral student in the researcher community of the specific disciplines (Dysthe et al., 2006; Pearson & Brew, 2002; Stubb, 2012; Vehviläinen & Löfström, 2014). In many cases, the supervisor provides the main connection to the wider researcher community, and by extension, to academic and professional norms. However, the dyadic relationship is also vulnerable, since it relies on a one-to-one interaction (Dysthe et al., 2006; Lee, 2007, 2008; Whisker & Claesson, 2013; Zhao et al., 2007). Accordingly, career changes of the supervisor or frictions within the relationships can have a huge impact in the doctoral studies compared to the team-based supervision providing multiple sources of support.

One of the strengths of the researcher community as a source of social support is that it provides feedback and encouragement, which may be individual but often bears common importance for all participants. For example, multiple sources of social support, such as group supervision, research seminars and other collective and flexible forms of social support have been shown to benefit doctoral students in their development to becoming independent researchers (Agne & Mörkenstam, 2018; Dysthe et al., 2006; Lee, 2018; Malfroy, 2005; Peltonen et al., 2017; Pyhältö et al., 2015; Rigg et al., 2013; Skakni, 2018b). The team-based supervision is also less exposed to changes within the research group, because if the doctoral students do not get the support they need from one person, they might receive it from another

person in the research team. Moreover, participating in and experiencing belonging to the researcher community has been shown to increase doctoral students' overall satisfaction with their study process (Dysthe et al., 2006; Hutchings, 2017; Pyhältö et al., 2012c), and promoting the successful transition into the post-PhD phase (Barnes et al., 2010; Jones, 2013; Halse & Malfroy, 2010; McAlpine & Amundsen, 2012; Olmos-Lopéz & Sunderland, 2015). Yet, the distribution of the tasks in a research team could be perceived as uneven or unfair among doctoral students. Students may also experience that they end up doing the work of others without direct benefit to their own doctoral work, and they may also feel that they have to compete against each other for the supervisor's attention (Löfström & Pyhältö, 2015; Pyhältö & Keskinen, 2012). Team based supervision typically provides coordination and cooperation between the supervisors, because the aim is to find a balance in the workload of individual students (Pyhältö & Keskinen, 2012). If there is lack of co-operation between supervisors, there is a risk that ambitious doctoral students could become involved in too many projects, causing them to be overwhelmed by work in different research projects (Pyhältö & Keskinen, 2012).

To summarise, the sources of social support provided to doctoral students are formed by a vast range of individuals and researcher communities and research groups, who doctoral students receive and seek support from during their doctoral studies. At its best, this results in the "super support network" (Mantai & Dowling, 2015, p. 118) comprising multiple yet well-connected sources of support such as supervisors, supervisor teams, other staff members in the researcher community, feedback systems, peer groups, and national and international professional academic networks. Identifying the resources and the challenges pertaining to different sources of social support, enables optimal utilization of the sources as part of the complex system of social support in doctoral education.

2.2.2 FORMS OF SOCIAL SUPPORT

Doctoral students receive social support from several sources, but for the support to be functional, the doctoral students also need several kinds of support to address the range of challenges they face during their doctoral studies (Jairam & Kahl, 2012; Pyhältö, 2018). It has been suggested that three complementary forms of support materialize in interactions between individuals (Barrera & Ainlay, 1983), entailing *informational*, *instrumental* and *emotional support* (see Cobb, 1976; House, 1981; Väisänen, Pietarinen, Pyhältö, Toom, & Soini, 2016). *Informational support* refers to intellectual information such as advice, guidance, feedback, affirmation and suggestions that doctoral students receive in order to develop their strengths and to cope with the new and sometimes difficult questions they face during their studies (Vekkaila et al., 2016). *Instrumental support* refers to more practical and

tangible support such as having an acceptable amount of time for the doctoral study process, having sufficient funding, work space, equipment, materials, writing recommendations or ensuring there is an equal division of work within the labour group to help the students to cope with challenges during their studies (Gardner, 2007; Ives & Rowley, 2005). *Emotional support* is comprised of empathy, trust, encouragement, showing interest, listening, supporting self-esteem, and, the sense of belonging to a network of the researcher community and with mutual obligation (Vekkaila et al., 2016). Additional emotional aspects such as caring and friendliness also entail a form of emotional support (Barnes & Austin, 2009; Halse & Malfroy, 2010; Lee, 2008; Strandler et al., 2014) provided by the supervisors and members of a researcher community.

There is evidence that doctoral students' value informational support such as receiving relevant feedback and advice from their supervisors as a crucial form of support (Devos et al., 2015; Pyhältö et al., 2015). Prior research has shown the importance of social support in the supervisor-supervisee relationship and in research communities as a combination of the different forms of support. An informational dimension entailing knowledge, suggestions, and feedback, as well as emotional aspects such as caring, support, and friendliness are important for a doctoral student's study progress (Ali, Watson, & Dhingra, 2016; Barnes & Austin, 2009; Halse & Malfroy, 2010; Lee, 2008; Pyhältö et al., 2015; Strandler et al., 2014). Doctoral students highlight and value the emotional support, including the supervisor's flexible, responsive and dialogical support strategies (Deuchar, 2008; Rogers-Shaw & Carr-Chellman, 2018). They also appreciate supervisors showing involvement and listening to them with empathy (Rogers-Shaw & Carr-Chellman, 2018), especially when facing stressful events. Doctoral students perceive supervisors to be their primary source of emotional and informational support (Devos et al., 2015).

At its best, the emotional support inspires, guides and enhances doctoral student research, or in turn, if ignored, a lack of emotional support may cause disruptions and delays in the study process (Cotterall, 2013). Prior studies have confirmed a relationship between constructive and encouraging support practices and doctoral student persistence and progress in the study progress (Bengtson, 2016a; Ives & Rowley, 2005; Pyhältö et al., 2017; Vekkaila et al., 2016; Wao & Onwuegbuzie, 2011). Moreover, external validation, recognition and support provided by others influences internal validation, e.g. self-belief crucial in the doctoral study (Mantai & Dowling, 2015). Doctoral students often report facing challenges related to the instrumental support. For instance, doctoral students have reported difficulties in institutional structures and applying for funding for their studies (Appel & Dahlgren, 2003). They would also like more advice regarding their uncertain financial situation (Appel & Dahlgren, 2003; Pyhältö et al., 2012c) and the excessive bureaucracy of the doctoral program (Pyhältö et al., 2012c). Also, short-term doctoral student

posts, the weak position of grant researchers and building a career after earning the PhD degree are perceived as being challenging (Pyhältö et al., 2015). Accordingly, the doctoral students would like to have more instrumental support in order to tackle the challenges. The different forms of support available for doctoral students determine whether they will succeed in coping with challenges that may arise during the doctoral experience.

2.2.3 SUPPORT FIT

The student-learning environments dynamics provided by doctoral education, ranging from institutional and disciplinary culture to dialogue between supervisors and the student, can be reflected in terms of the support fit. Matched social support plays a major role in the positive doctoral experiences and study progress. Matched support refers to the alignment between the social resources that doctoral students need and those provided or made available to them during their doctoral experience (cf. Pyhältö et al., 2015). So, to be effective, the support needs to be matched (Cohen & McKay, 1984; Helgeson & Gottlieb, 2000). This means that the support provided should advance the students' ability to cope with the range of challenges or problems that occur during the doctoral study process i.e. fit the support need. In order to be matched, the support needs to fulfil two criteria: firstly, the support should be available, meaning that a lack of support is mismatched support; secondly the type of support offered needs to be suitable in terms of the support needed, meaning that the type of support should be beneficial for the purposes of the doctoral student (cf. Pyhältö, 2018). Hence, the support should be aligned with the student's competence, and the situation (cf. Pyhältö, 2018).

Matched support, in terms of available support and frequent supervision in the supervisory relationship has been shown to contribute to study progress and a more positive doctoral experience (Martinsuo & Turkulainen, 2011; Max Planck Society, 2017; Pyhältö et al., 2012c; 2015). For instance, doctoral students value their supervisors' efforts in allocating time for the supervisory meetings and discussions regarding their research work (Devos et al., 2015). Moreover, both doctoral students and supervisors have reported emotional support, constructive feedback, collaborative thinking, promoting doctoral students' active agency in the researcher community and coaching students in their own study path to be beneficial in the supervisory relationship (Pyhältö et al., 2015). This matched support has been found to be associated with the doctoral student's satisfaction with their doctoral studies (Baker & Pifer, 2013; Pyhältö et al., 2012c). The matched support in terms of high-quality supervision has been shown to contribute to the timely completion of the degree, satisfaction with the doctoral program (Gardner, 2007; Golde, 2005;

Ives & Rowley, 2005; Stubb et al., 2011; Wao & Onwuegbuzie, 2011) and degree completion (Jairam & Kahl, 2012).

In turn, mismatched support is characterized by a lack of alignment between a student's needs and the support available. A mismatch can take form of inadequate support, when the support available does not match the student's needs, or a lack of support. Mismatched support is typically reflected in a student's experiences of unhappiness and dissatisfaction. One of the main challenges reported by doctoral students is inadequate supervisory support (Pyhältö et al., 2012c). Mismatch in the form of discomfort with the supporting style of the supervisor, or incongruence between values of priorities in the relationship, have been frequently reported (Devos, Boudrenghien, Van der Linden, Frenay, Azzi, Galand, & Klein, 2016). Incompatible expectations in terms of supervisory support may also occur due to different cultural practices between students conducting their dissertation in a foreign country and cross-cultural supervisors. For instance, findings on international doctoral students in Denmark and their supervisors indicate that international students expect to receive assessments of how they are performing, while supervisors place greater emphasis on providing feedback on the students' personal growth to finalize the dissertation (Elliot & Kobayashi, 2018). Mismatched support between doctoral students' expectations, goals and the practices of their researcher community is reported as perseverance (Golde, 2005). Mismatched support in terms of insufficient feedback and lack of support during doctoral studies has been shown to be related to an increased risk of mental illness (Levecque, Anseel, De Beuckelaer, Van der Heyden & Gisle, 2017; Pyhältö et al., 2015) and experiences of burnout (Vekkaila et al., 2016). It has been suggested that a combination of lack of support and high demands can lead to reduced wellbeing (Bakker & Demerouti, 2007) and increase the risk of attrition (Lovitts, 2001; Pyhältö et al., 2015).

To sum up, the support fit is a core regulator of doctoral experience. While the matched support implies alignment with a doctoral student's needs and the support received, mismatched support is characterized by a lack of alignment between the student's needs and the support available or provided. Paying attention to both the frequency of support and the form and quality of social support may cultivate the development of a support system that meets the doctoral student's needs by providing adequate social support during the whole doctoral study process. However, the support fit between doctoral students and their socially-embedded learning environment is not a stable entity. Accordingly, the support fit evolves in everyday interactions between a doctoral student and their researcher community, and the doctoral students and the various sources in the researcher community can influence the fit (Vekkaila, 2014).

2.2.4 SUPPORT DYNAMICS

Support dynamics refers to the roles of different actors in support behaviours, including receiving, giving support to somebody else or reciprocal support (cf. Pyhältö, 2018). The mutual interaction and the roles of the giver and the receiver of the support are central determinants of supportive behaviour; they are therefore useful in assessing whether social support from a specific giver has a positive impact on the receiver (Cohen & Syme, 1985). Recent research indicates that both post-PhD researchers (Vekkaila et al., 2016) and doctoral students (Pyhältö & Stubb, 2012) receive support more often than offer support to others. Considering that doctoral students are learners on their doctoral path, this result is partly to be expected. However, doctoral students also have to be responsible for seeking support to enhance their own research project. In the long run, they need to learn how to give support and build relationships based on reciprocal and co-constructional support, because it is a precondition for building appropriate researcher networks (cf. Pyhältö, 2018).

Functional support dynamics cannot be taken as granted. There is evidence that a number of doctoral students view themselves as passive objects in their studies, lacking agency, and, experiencing disconnection (Pyhältö & Keskinen, 2012). Doctoral students have also been found to experience insecurity about their role in their own researcher community (Pyhältö et al., 2009; Pyhältö & Keskinen, 2012; Stubb et al., 2011). It may not always be clear to the students where to find support. Therefore, it is important to coach the students in the researcher community both inside the institution and in a wider international context to recognize and make use of a range of support sources, including international researcher networks. If doctoral students have an opportunity to take a progressive stance in their doctoral journey by operating as active agents and by seeking support when it is needed, their studies are more likely to proceed in a timely manner (Pyhältö & Keskinen, 2012).

To sum up, the social support system in doctoral studies comprises several support sources, forms of support and support fit, and the support dynamics complement each other and a doctoral student's unique experiences with such support. The outcome of doctoral studies in this research is explored in terms of doctoral students' experiences of their perceived satisfaction and their experiences of burnout.

2.3. EXPERIENCES OF SATISFACTION AND BURNOUT AS OUTCOMES OF DOCTORAL STUDIES

Doctoral students' experiences in the learning environment provided by doctoral education can be investigated through the lens of their experiences of satisfaction

with their study experience (Pyhältö et al., 2012c, 2015; Sakurai, Vekkaila, & Pyhältö, 2017; Zhao et al., 2007). Further, doctoral students' experiences may also be explored through the somewhat opposite perspective, through their risk of suffering from burnout (Peltonen et al., 2017). Burnout has two distinctive symptoms: exhaustion and cynicism (Freudenberger, 1974; Maslach & Jackson, 1981; Scaufeli, Martinez, Pinto, Salanova & Bakker, 2002). Exhaustion is characterized by feelings of strain, chronic fatigue and lack of emotional energy (Maslach, Schaufeli & Leiter, 2001). Cynicism refers to depersonalization and an excessively detached response to colleagues and other aspects of the work (Maslach, 2003). Both exhaustion and cynicism have been shown to emerge from work overload caused by heavy job demands, and social conflict at work (Maslach, 2003).

Doctoral students face a range of stressors during their studies that prevent them from maintaining the focus to complete their doctoral studies. Undertaking doctoral research can become overwhelming: they might start a family, funding might end, or they might not get enough funding, or they could lack appropriate support. This results in some doctoral students not completing their degree. To pursue a doctoral degree is recognised as being both intellectually and emotionally challenging (Barry, Woods, Warnecke, Stirling, & Martin, 2018; Cotterall, 2013; Mantai & Dowling, 2015; Wisker, 2012; Skakni, 2018a; Stubb, 2012; Vekkaila, 2014). Doctoral students report that they sometimes experience feeling lost (Bengtson, 2016b), abandoned and even "orphaned" (Wisker & Robinson, 2012) from the social support systems that are meant to back them up during their doctoral studies. Lack of support and negative experiences may have significant consequences both for the individual and the institution. If doctoral students cannot keep up with the work-life balance during their doctoral study process, it may not only lead to burnout, but also attrition (Schmidt & Hansen, 2018). Attrition will result in social, intellectual and financial losses for individual, institution as well as for society (Golde, 2005; Schmidt & Hansen, 2018).

Social support is particularly important for doctoral students since they work continuously at the edge of their competence (Vekkaila, 2014), which makes them particularly emotionally vulnerable to negative experiences (Stubb, 2012), putting their wellbeing at stake. As a result, adequate social support and having a collegial supervisory relationship are critical for both doctoral students' wellbeing and for their study success (Katz, 2018). For instance, emotional exhaustion has been shown to be eased by integrating doctoral students into the researcher community, providing sufficient social support and engaging them in collaborative knowledge sharing (Malfroy, 2005; Pyhältö et al., 2009; Sala-Bubaré & Castello, 2017; Vekkaila et al., 2012). The collective forms of social support have also shown to benefit doctoral students in the development of becoming independent researchers (Dysthe et al., 2006; Rigg et al., 2013; Pyhältö et al., 2015). Moreover, proving social support in the form of frequent supervisory meetings with supervisors, a constructive supervisory

relationship, a relaxed atmosphere during meetings, and a sympathetic and caring attitude to the doctoral student have been associated with satisfaction and good doctoral studies progress (Hermann et al., 2014; Ives & Rowley, 2005; Pyhältö et al., 2015; Pyhältö, 2018; Zhao et al., 2007).

However, prior studies have shown that doctoral students often experience stress and exhaustion during their doctoral studies (Appel & Dahlgren, 2003; Hunter & Divine, 2016; Hermann et al., 2014; Hyun, Quinn, Madon, & Lustig, 2006; Jacobsson & Gillström, 2006; Jairam & Kahl, 2012; Peltonen et al., 2017; Stubb et al., 2011). A comparative study in four countries (Finland, Sweden, Ireland and Spain) showed that students perceived the study demands as being excessive compared to the duration of their studies and they experienced significant levels of stress (Jacobsson & Gillström, 2006). Prolonged work-related stress can increase the risk of doctoral students' burnout. For example, a recent, large-scale (over 2200 participants) study on German doctoral students (Max Planck Society, 2017), reported that two out of three doctoral students experienced at least one symptom of stress, associated with burnout. Furthermore, another large-scale Belgian study ($n = 3659$ respondents) revealed that between 32 and 51% of the sciences doctoral students were at risk developing psychiatric disorders, especially depression (Levecque et al., 2017). The doctoral students often reported experiencing strain and pressure, unhappiness and depression, sleeping problems, challenges with overcoming difficulties and lack of enjoy in everyday activities (Levecque et al. 2017). Moreover, the prevalence of having or developing mental illness was shown to be more than double for doctoral students, compared to other highly educated people in the general population, and almost double the rate compared to higher education students in Belgium (Levecque et al., 2017) The level of psychological distress has been found to be higher for doctoral students than the age-matched general population in Belgium, the Netherlands (Meijer, van der Weijden, van der Ven & Beukman, 2017) and Australia (Barry et al., 2018).

Consequently, the social support the doctoral students receive from their supervisors and researcher community is fundamental to their wellbeing and for the successful transition into post PhD careers (Barnes et al., 2010; Chen et al., 2015; Halse & Malfroy, 2010; Jones, 2013; McAlpine & Amundsen, 2012). If the doctoral students are not provided with sufficient formal and informal social support to overcome the challenges they are faced with during their period of study, they are likely to experience extensive stress that in the long run will increase the risk of suffering from burnout (Peltonen et al., 2017; Vekkaila et al., 2016) and the risk of attrition (Ali & Kohun, 2007; Castello et al., 2017; Hunter & Divine, 2016; Jacobsson & Gillström, 2006; Jairam & Kahl, 2012; Levecque et al., 2017; Lovitts, 2001; Pyhältö et al., 2015). It is evident that the balance between work (in this case, doctoral studies) and family life is of great importance for doctoral students to experience wellbeing (Appel & Dahlgren, 2003). To cope with the challenging

doctoral studies, the informal networks of support (peers, family and friends) may provide a central resource for the doctoral journey by strengthening doctoral students' wellbeing (Bengtson, 2016b; Bengtson & Barnett, 2017; Bryan & Guccione, 2018; Elliot et al., 2016; Hoopwood, 2010; McAlpine & Amundsen, 2012; Wisker et al., 2017). The outcomes of the doctoral study process for the doctoral students depends strongly on the social structures that are provided to doctoral students during their doctoral trajectory. Hence, social support provided by the socially-embedded system of doctoral education plays a crucial role in the doctoral studies.

2.4 SUMMARY OF THE THEORETICAL FRAMEWORK

This study focuses on exploring doctoral education as a nested socially-embedded systemic learning environment for doctoral students, comprising the institution, research team and supervisory relationships (Barnett, 2018; Pyhältö et al., 2012b). The Researcher Community and Supervisory Support-model (Pyhältö, 2018) offered an analytical tool for exploring the social support within this system. Each layer, or level, contains interactions between doctoral students and their environment. The Job-Demands and Resources-model (JD-R-model) (utilized in Part-study I) on the other hand, (Demerouti et al., 2001; Schaufeli & Baker, 2004) offered a lens through which to explore the resources and challenges of the doctoral journey ranging from individual resources to structural challenges, embedded within the different levels of the system. The theoretical lenses and the application of the merged insights of these two models together provided tools to understand the complexity of the nested social support system provided by doctoral education better.

The social support system provided by the environments plays a central role in the doctoral experience. Social support refers to the social resources identified and provided (Cobb, 1976; House, 1981) to doctoral students by the learning environment provided by the doctoral education. This dissertation drew on The Researcher Community and Supervisory Support model (Pyhältö, 2018) in order to explore the several components of social support provided by the doctoral education. In this doctoral dissertation, the focus was on supervisory and researcher community support since they have been identified as core of the social support for the doctoral students, in prior literature. The supervisory and researcher community support was examined in terms of sources of support, the forms of support, and support fit. It was presumed that the social supervisory and researcher community support would contribute to doctoral students' satisfaction with their studies and reduce the risk of them experiencing burnout. A premise was that if the system of social support fails and the demands on the students are too high, it may lead to psychological costs in the form of reduced wellbeing (Bakker & Demerouti, 2007).

2. Theoretical Frame

Figure 2 shows the recognition of resources and challenges and the contribution they make in the socially-embedded nested system of social support. The figure illustrates the influence of the three components (sources, forms and fit) in social support interactions between the doctoral students and their socially-embedded learning environment in relation to doctoral students' experiences of satisfaction and burnout in doctoral education.

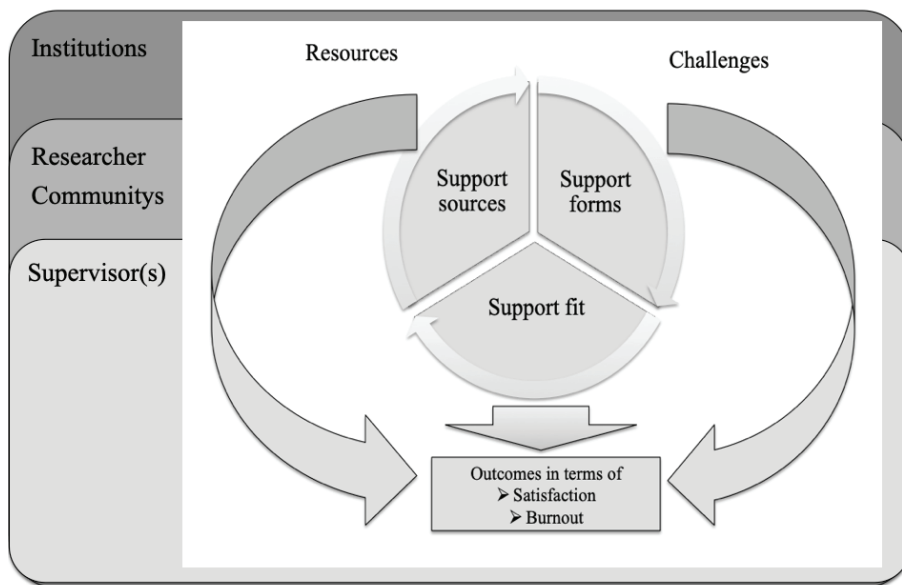


Figure 2. An overview of doctoral education as a socially-embedded nested learning environments, including resources and challenges as key regulators, and satisfaction and burnout as doctoral student experience.

3. RESEARCH QUESTIONS

The aim in this study is to gain a better understanding of the complexity of the nested social support system provided by doctoral education by exploring it from both doctoral students' and supervisors' perspectives. The first part-study focused on examining how doctoral supervisors perceived the primary resources and challenges of doctoral studies embedded in the different levels of the nested learning environment provided by doctoral education. The second part-study is an exploration of how doctoral students' experiences of the complementary components of supervisory and researcher community support and how the experiences were related to their experiences of satisfaction and experiences of burnout in their doctoral studies. The aim of the third-part study was to advance a cross-cultural understanding of doctoral students' unique experiences of support sources, forms of support and support fit provided by the supervisors and the researcher communities embedded in two national contexts, Denmark and Finland.

The aims were approached through the following research questions:

RQ 1. How do doctoral supervisors perceive the resources and challenges of doctoral studies provided by the socially-embedded nested system of doctoral education?

RQ 2. How do doctoral students experience social support as viewed through support sources, forms, and fit, and how do these relate to experiences of satisfaction and burnout?

RQ 3. What differences and similarities can be identified between Danish and Finnish doctoral students' experiences of supervisory and researcher community support, perceived support forms and support fit experiences?

Distinct research questions for each of the three part-studies were specified in order to reach the general aims. The overall theme – social support in doctoral education – was analysed in all three part-studies.

4. METHODS

4.1 MIXED METHODS

This research was carried out by using mixed methods (Creswell, 2008, 2014; Creswell & Plano Clark, 2018; Johnson & Onwuegbuzie, 2004; Johnson, Onwuegbuzie, & Turner, 2007; Onwuegbuzie & Johnson, 2006), which involve utilising qualitative and quantitative data. In a mixed methods design, both forms of data may have equal priority in answering the research questions (Johnson et al., 2007). This research project involved multiple phases (Teddle & Tachakkori, 2009) and data that were collected both on a sequential basis and on a concurrent basis (Creswell, 2008, 2014; Creswell & Plano Clark, 2018) as follows. The initial phase of the research, the supervisory interviews, used a qualitative research design (Part-study I). In the data analysis, the results utilized qualitatively constructed base categories (supervisors' perceptions of resources and challenges in the doctoral study process). Quantitative indicators including frequencies and percentages along with cross tabulations have been reported to indicate the prevalence of categories in relation to each other. Part-study II applied a quantitative approach, and the data were based on a doctoral student experience online-survey (Pyhältö et al., 2011). In this study, explorative factor analysis, correlation, and multiple regression analyses were applied, to identify the relationships in doctoral students' social support experiences and experiences of satisfaction and burnout in their doctoral studies. Part-study III employed a convergent mixed methods design (Creswell, 2014; Creswell & Clark, 2011) in which quantitative and qualitative data were gathered in a cross-cultural doctoral experience survey (Pyhältö et al., 2015) using a mix of survey items and open-ended questions. Accordingly, in Part-study III, both quantitative analyses and qualitative open-ended descriptions were used in the analysis process. The analysis was undertaken in two distinct phases; quantitative followed by qualitative. Thus, Part-study III as a mixed methods study and the doctoral research represent a sequential explanatory mixed methods design (Creswell, 2008, 2014; Creswell & Plano Clark, 2018). The design procedures in this research are shown in Figure 3.

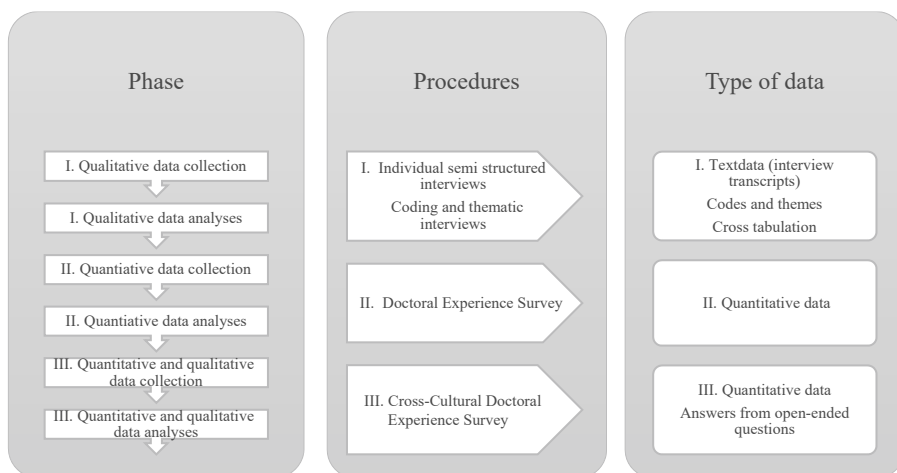


Figure 3. The design procedures of the research (adapted from Creswell & Plano Clark, 2018).

The mixed methods approach is underpinned by a pragmatist view that acknowledges the selection of different methods based on what data are relevant and accessible (Creswell, 2014; Johnson & Onwuegbuzie, 2004; Johnson et al., 2007). It is oriented to real-world practice, which may capture both espoused theories and theories-in-use (cf. Argyris & Schön, 1974), i.e. individuals' World views, values and beliefs, and the behaviours that these translate into. From a pragmatist point of view, both constitute valid perspectives into understanding social constructions in the World around us. Consequently, both may constitute valid research data, however they can be approached from different methodological perspectives, with different interpretive input from the researcher, and they may contribute to the existing knowledge base in different ways. This research operates in the sphere of espoused theory, which is readily available through self-report survey data and interviews. At the same time, the study investigates self-reported behaviours, i.e. it approaches the sphere of theory-in-use.

4.2 CONTEXTS

Internationally, doctoral education tends towards a comparable structure in terms of content, breadth, length and quality (Kyvik & Tvede, 1998). All the Nordic countries implemented the Bologna three-cycle process (Gudmunsson, 2008), but the forms of doctoral education as part of the higher education system in the Nordic region have undergone major changes. These changes have been implemented at different times and to different extents in the Nordic countries (Gudmunsson, 2008). This research focused on two countries, Finland and Denmark, because the educational

systems in these countries share important cultural characteristics and a strong tradition of public education, including the university level. In Finland, the number of doctoral students enrolled during 2018 was approximately 17 000 (Education Statistics Finland, 2018) and in Denmark the number of doctoral students enrolled in 2018 was over 9100 (Statistics Denmark, 2018). Finland and Denmark produce a similar number of PhD degrees annually and have weighted citation impacts above the World average (Nordforsk, 2011). Denmark, and Finland are similar in terms of publication productivity (Nordforsk, 2011) and graduated PhD students (Danish Ministry of Higher Education and Science, 2016). However, the Nordic countries face challenges in their doctoral education, because high attrition rates are a common question of concern. The basic structures of doctoral education in Finland and in Denmark are similar in that both countries are committed to the Bologna process and there are no tuition fees (Andres et al., 2015), for either EU students or non-EU students.

In Finland, doctoral students are required to have obtained a master's degree in order to undertake doctoral education. The research board of a doctoral school assesses the applications according to the research plan and research is launched at the beginning. The requirements are to complete postgraduate courses (from 40 to 60 units in the European Credit Transfer and Accumulation System (ECTS), depending on discipline). A doctoral dissertation in Finland can be completed either in the form of a monograph (book format) or as a series of articles that includes a summary (Finland's Council of State, 2004). The article-based thesis consists of three to five peer-reviewed journal articles and a summary. Currently, the dominant thesis format is through publication of articles (Pyhälto et al., 2011). At many universities, the policy for doctoral education requires at least two supervisors. Doctoral students can study as full-time or part-time students. They are supposed to graduate in four years, but time for completion is typically longer, approximately 5–6 years (Cornér & Lindholm, 2013; Pyhälto et al., 2011; 2015). Typical funding sources are grants from foundations, project funding, doctoral student posts from the university, and work outside the university (Cornér & Lindholm, 2013; Pyhälto et al., 2011; 2015). For Finnish students, going abroad is voluntary, with the aim of enhancing the research project during the doctoral studies.

In Denmark there are two routes into doctoral education. The first model, the 4+4 model, including first a master's degree, followed by a four-year PhD during which the student is perceived more as 'a student'. The more traditional second model, in which their status is that of a staff member, is the 5+3, in which the applicant has obtained their master's degree and then applies to undertake a three-year PhD. Applications to enter doctoral studies are assessed by the Graduate School. The doctoral students taking part in the 5+3 model are not always solely funded by their university or by national research grants. They can often be co-funded by private companies, organizations, or university colleges (former professional schools). These

stakeholders are not addressed in this study per se, and the informants were not from these groups. However, these stakeholders do appear in this study through the views and experiences expressed by the informants. For instance, supervisors talk about the struggle finding financing for their doctoral students.

The supervisory team consists of a minimum of two supervisors, a main supervisor and one or two co-supervisors. In the Danish context, supervisors trust their supervisees to be self-regulated and goal orientated (Kobayashi, 2014). Hence, they have high expectations from their doctoral students. The principal supervisor is the person, who in cooperation with the graduate school, has the right to recommend that the PhD student continues with their studies or terminates them if the formal requirements have not been met (Kobayashi, 2014). The PhD dissertation can be submitted as a monograph or as an article-based dissertation. An article-based dissertation consists of four peer-reviewed, but not yet necessarily published journal articles (but must be accepted for publication), and a summary. Danish doctoral students must spend one semester abroad at a university or in an international research context.

The national contexts differ in some respects (Kyvik & Tvede, 1998). There are divergent paths into doctoral education in Finland and Denmark, opportunities for international mobility, and they differ regarding funding for doctoral students (Andres et al., 2015). The cross-national comparison of doctoral students' supervisory experiences therefore makes comparison relevant. In addition, only universities can grant a doctoral degree in Finland. When it comes to international activities, a research exchange period is a compulsory part of the doctoral study process in Denmark, in contrast to the Finnish educational system. To aid interpreting the findings, a comparison table has been developed (see Figure 4). The content box illustrates the similarities and differences on several levels in Danish and Finnish doctoral education based on sources from Andres et al., 2015; The Danish Ministry of Higher Education and Science (2016); Finland's Council of State, 2004; NordForsk Policy Briefs (2011) and Official Statistics of Finland (OSF).

Similar characteristics in the educational systems	Different features in the educational systems
<ul style="list-style-type: none"> Both countries focus on the equality aspect in their educational systems. Both systems emphasize independent, individual research aimed at original contributions to scholarly knowledge Both Finnish and Danish universities had weighted citation impacts that fell above the world average between 2005 and 2009. No tuition fees according to the Bologna Process agreement Various sources of funding. Students fund their doctoral study process by fixed funded doctoral positions or by various funding opportunities including long or short-term grants, project funding by companies etc. Structured PhD program with courses on specific research transferrable skills Universities cooperate with other PhD programs internationally in the form of summer schools, and researcher exchanges. The supervisor teams consist of at least two supervisors. The PhD dissertation can be submitted as a monograph or as an article-based dissertation. 	<ul style="list-style-type: none"> Only universities (but not polytechnics, now called universities of applied sciences) can award a PhD in Finland. Going on a research exchange is voluntary for Finnish doctoral students and compulsory for Danish students. Some variation in publication requirements, both at a national level and between disciplines. In Denmark, the article-based dissertation usually contains 4 published articles. In Finland, 3-5 articles should be published by the time of dissertation submission and the doctoral student should be the first author in the majority of the publications. The duration of the PhD program averages 3 years in Denmark and 5 years in Finland. In Finland PhD students have the option to become a member of the university or student unions.

Figure 4. Comparison table of characteristics for Danish and Finnish doctoral educational systems.

4.3 PARTICIPANTS

The participants in this research comprised three samples: 1) Doctoral supervisors, 2) Doctoral students in Finland, and, 3) a cross-national sample including doctoral students in Denmark, and multi-level sampling was used. Hence, the participants were different individuals from different populations. Both formats, the article-based dissertation and the monograph, were considered in the data collection.

The supervisors sample included 15 PhD supervisors from three Finnish universities. The participants were selected intentionally through purposeful sampling (Creswell & Plano Clark, 2018), since they were identified as individuals having insight into doctoral student social support in terms of resources and challenges in the doctoral study process. The participants were all full-time professors (eight female and seven male) representing 15 degree programs. The programs were mainly taught in Swedish. In Finland, there are two official languages: Finnish and Swedish. Although Swedish language speakers are the minority group, the official language status guarantees that Swedish language speakers have the same language-related rights as the Finnish language speakers (Vincze & Harwood, 2015). Socioeconomically,

this language minority is not perceived as a disadvantaged minority group. In fact, compared to the majority language group of Finnish speakers, the Swedish language speakers are not disadvantaged in terms of educational level and socio-economic status (Mika Witting, Statistics Finland, personal communication, January 24, 2020; Aino Hiekkala, Statistics Finland, personal communication, January 27, 2020). Swedish speakers in Finland identify themselves as Swedish-speaking Finns.

The participants were supervisors representing the social sciences (5), medicine (3), economics (2), natural sciences (3), humanities (1) and engineering (1). The risk of potential harm and risk of harm of preserving the supervisors' anonymity was recognized. It was important to preserve anonymity, since the number of Swedish-speaking professors within different disciplines is limited. The supervisors were recruited as they were known to be experienced professors in their respective degree programs and therefore, they could be expected to have a broad overview of doctoral education. They were selected because of the language in which they teach and their discipline in order to get a broad coverage of disciplines and perspectives. The participants had supervised over 115 doctoral students with a supervisory experience that ranged from 5 to 25 years and all participants had supervised doctoral students to completion. At the time of data collection, the professors were currently supervising an average of eight doctoral students each. All the interviews were done face-to-face by the author of this dissertation. The data collected from the doctoral supervisors were utilized in Part-study I.

The doctoral student sample included 248 doctoral students representing a broad range of disciplines at three research universities in Finland. The doctoral students represented humanities and theology (75/30%), natural sciences and engineering (52/21%), social sciences and law (40/16%), behavioural sciences (35/14%), economics (30/12%) and medicine (16/6%). Most of the respondents (147) were women (59%) and 101 were men (41%). The average age was 30-34 years. In terms of sex and age, the sample was representative of the population (Cornér & Lindholm, 2013). The participants were in various phases of their doctoral studies, and 52%, had completed two-thirds of their thesis, according to their own estimate. Thus, they had considerable experience studying at the doctoral level. About half of the participants (51%) were full-time students and the other half (49%) was completing their doctoral studies part-time. The participants obtained funding for their doctoral education from a range of sources. Over half of them (55%) were compiling an article-based dissertation, and 39 % per cent were writing a monograph. Six per cent were undecided about the form of their dissertation. The data collected from the doctoral students were utilized in Part-study II.

The cross-national doctoral student cohort represented doctoral students in social science and humanities disciplines in Finland and Denmark. In total, 381 doctoral students from one research-intensive university in Denmark (n=145) and two research-intensive universities in Finland (n=236) were included. Most of the

respondents were women (270/72%). The average age for the whole sample was 36.5 years. Based on doctoral students' self-reports, they were at different phases in their doctoral studies: 11 per cent were at the beginning; 45 per cent were in the middle stage and 44 per cent were in the last third of their studies, which means that a considerable portion of the sample had extensive experience of being a doctoral student. Most of the students (57%) were compiling an article-based dissertation, and over one-third of them (39%) were writing their doctoral thesis in the form of a monograph. About two-thirds of the students (66%) were conducting their doctoral studies full-time the rest (34%) were completing their doctoral studies part-time. The cross-national doctoral student sample represented well the population of doctoral students enrolled in social sciences and humanities disciplines in 2015 in both Denmark and Finland (Aarhus annual report, 2017; Official statistics Finland, 2018; Pyhältö et al., 2016). The data collected from the cross-national doctoral students in Denmark and Finland were utilized in Part-study III.

4.4. DATA COLLECTION

The data for this research were collected from doctoral supervisors by an interview protocol and from doctoral students based on two survey questionnaires (see Appendix 1, 2 and 3). The data collection was carried out during between 2013 and 2015.

4.4.1 SEMI-STRUCTURED SUPERVISORY INTERVIEWS

Interviews were conducted in order to gain an understanding of how doctoral supervisors perceive factors contributing to the doctoral process as well as where on the systemic level the factors perceived were located. The participants were invited by email to participate in an interview. The recruitment of participants in the interview sample was done in order to cover a broad range disciplines, in which professors responsible for Swedish-speaking programs were represented. The broad coverage of disciplines was justified by the fact that the three universities have a legal responsibility to educate enough individuals proficient in Swedish for the needs of the country (Finland's Council of State, 2004). All in all, 18 supervisors were invited to participate, but three declined the request. The interview protocol was translated from Finnish into Swedish and carried out by using a supervisory experience interview protocol (cf. Löfström & Pyhältö, 2012) (see Appendix 1). The interview instrument was first piloted at one university with three supervisors. Only minor modifications were made to the questions. The three pilot interviews were included in the analyses. The interviews consisted of 15 main questions. The

questions relevant for our purposes drew on the theoretical model for Job Demands and Resources (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Schaufeli & Bakker, 2004). Further, background questions on their discipline, work history, range of supervisory experience, current number of doctoral students, main dissertation form, the languages the dissertations have been written and the number of dissertations supervised during the last ten years were included. Interviews lasted between 30 and 50 minutes. The interviews were digitally recorded and transcribed verbatim by trained research assistants. The interview data were utilized in Part-study I.

4.4.2 THE DOCTORAL EXPERIENCE SURVEY AND THE CROSS-CULTURAL DOCTORAL EXPERIENCE SURVEY

The *Doctoral Experience Survey* based on Pyhältö et al., (2011) was utilized to investigate the interrelation between the social structures in the learning environment provided by doctoral education and to examine how the perceived social support from the various support sources was related to experiences of satisfaction and burnout (Appendix 2). The survey has been developing since 2006 and has been validated in several contexts (earlier versions Pyhältö et al., 2009; 2015). *The Doctoral Experience Survey* was piloted before the actual data collection. Only minor changes, mainly clarifications of the Swedish language translation, were made. The response rate was 36%. The survey was sent to all doctoral students registered with Swedish as their mother tongue at three Finnish universities. The student contact information was collected from the student register database at each university. Scales measuring supervisory support (5 items), researcher community support (4 items) and doctoral students' perceptions of equality in the researcher community support (4 items) were utilised. Moreover, the indicators measuring the doctoral experience of stress, exhaustion and cynicism were explored through a combination of several measures. The scale was combined through a four-item exhaustion scale, a three-item scale measuring cynicism and a one-item stress scale (Elo, Leppänen, & Jahkola, 2003). Except for the satisfaction and stress scale, a 5-point Likert scale was utilized. Doctoral experiences of stress and satisfaction were measured with one-item scales. The following background variables were used: dissertation format (monograph/article compilation), study status (full-time/part-time), attrition intentions (one item: yes/no), and engagement in international research collaboration were explored. It took 15 to 20 minutes to complete the online survey. The survey data exploring the relationship between doctoral students' experiences of both supervisory support and community support in relation to experiences of satisfaction and burnout were utilized in Part-study II.

In the last phase of the data collection, *The Cross-Cultural Doctoral Experience Survey* (Pyhältö et al., 2009; 2015), was adopted (see Appendix 3). Danish and Finnish doctoral students' experiences were collected to gain a broader, cross-cultural understanding of social support. Social support (in terms of supervisory support and researcher community support, different support forms and support fit) and different attributes associated with the experienced support was examined. The data collection was conducted in 2015, and, the recruitment of the respondents was done by email. Data were collected from students at three universities; two in Finland and one in Denmark. The survey was available in Finnish, Swedish and English. It was sent to all registered social science and humanities PhD students at the three universities. Before the data collection, the survey was validated with a pilot study comprising 100 doctoral students in educational sciences. The response rate for *The Cross-Cultural Doctoral Experience Survey* was 29%.

The Cross-Cultural Doctoral Experience Survey (Pyhältö et al., 2009; 2015) contained a supervisory support scale (10 items), a researcher community support scale (8 items), and a scale measuring destructive friction (8 items). A 7-point Likert-type scale was utilized (1=unsatisfied/strongly disagree to 7=completely satisfied/fully agree). Moreover, the students were asked to name the key experiences of their doctoral progress, i.e. their emotional highs and lows. This was explored with two open-ended questions: "Doing doctoral research entails a range of events and turning points, both positive and negative. The most positive event or experience from the beginning of my doctoral journey until now was when [please note when this happened]." and "The most negative event or experience from the beginning of my doctoral journey until now was when [please note when this happened]." In addition, background questions, such as the dissertation format (monograph/article compilation), study status (full-time/part-time), attrition intentions (one item: yes/no), research group status (alone/in a group/both), and engagement in international research collaboration were explored. It took 15 to 20 minutes to complete the survey. The survey data on the perceptions of different elements of social support in a cross-cultural setting were utilized in Part-study III.

4.5 ANALYSIS

Quantitative and qualitative analyses were applied in order to explore the dynamics of the systems of social support embedded in the doctoral thesis process as elements of a successful doctoral completion. Qualitative analyses were conducted in the first part-study to identify the variety of social support in doctoral education as identified by experienced supervisors. These were followed in the second part-study by quantitative analyses of the extent and pervasiveness of social support from doctoral students' perspective. In the third part-study quantitative analyses

were conducted in combination with analyses of open-ended questions (qualitative methods) to gain a broader understanding of the systems of social support in the doctoral study process from a cross-cultural perspective.

4.5.1 ANALYSES OF THE SUPERVISORY INTERVIEWS

To achieve the best understanding of the phenomenon, the supervisory interviews were qualitatively content analysed (e.g. Marshall & Rossman, 1995; Patton, 1990). Content analyses give attention to differences and similarities through codes and categories (Graneheim & Lundman, 2004). Distinct stages of the content analysis process of the supervisory interviews represent either inductive or deductive approaches (Flick, 2009). The aim for the data-oriented inductive strategy (Holyoak & Morrison, 2005) in the supervisory interviews was to make observations about what the supervisors' brought up as key regulators in each text.

Initially, in order to get a general sense of the supervisors' answers and to reflect on the overall meaning, careful reading of the transcripts was done (Creswell, 2014). The organizing of the data started with coding all the text segments in which supervisors referred to the key regulators in doctoral studies into the same category (see Figure 5). One unit of analysis was a whole text segment and defined here as an extraction from the data describing a full thought or theme and its immediate elaboration. The length of the text segments ranged from one to several sentences. The text segments contained information about what is understood as necessary, important or useful for doctoral students, or their opposites. The text segments included attributes that the supervisors gave priority to or referred to as dissatisfactory. In this first step of analysis, 217 text segments of the key regulators were identified.

After this initial recognition of the key regulators, the second step in the data analysis proceeded with a deductive approach (Coffey & Atkinson, 1996; Levin-Rosaliz, 2004; Morgan, 2007). Through their experiences, the perceptions of supervisors about the key regulators could be further categorized as resources and challenges in doctoral studies. The data were coded into two basic categories; (1) Resources and (2) Challenges in doctoral studies. Resources comprised of text segments in which the supervisors described processes on the doctoral journey that work well, promoted the thesis process and were perceived in a positive way by the supervisors. Text segments described as resources also included arguments that the supervisors emphasized as important for success in the doctoral study process. The category for challenges, in turn, included text segments in which the supervisors described processes that presented obstacles to the thesis process. The characterization of challenges also included text segments referring to problems or difficulties, such as lack of support or other kinds of challenge, which led the supervisors to articulate dissatisfaction.

Finally, five themes were identified as common denominators among resources and challenges – by means of an inductive strategy. This approach was taken in order to develop a thematic framework (cf. Braun & Clarke, 2006) of the underlying structure of the supervisors' perceptions about resources and challenges. A first set of categories (called *Structures*) was defined. The category included the supervisors' observations of issues related to funding, infrastructure, and physical facilities. A second set of text segments was identified as *Organization of doctoral education*. This category was described as human resources and administrative processes, including the recruitment process of doctoral students and training. The next category identified was called *the Scholarly community*. Text segments in this category explained the students' participation in the scholarly community, in different research groups, to the support of the team and to international contacts and networks. In the next category, the supervisory relationship, the explanations related to the supervisory relationship with the students, to the frequency of supervision, different supervisory practices and co-operation and interactions among supervisors. Finally, explanations of both generic and research-specific competencies of doctoral students were identified. The category was named *Individual competencies*. These five data-driven sub-themes (*Structures*; *Organization of doctoral education*; *The scholarly community*; *Supervisory relationship*; and *Individual competencies*) were identified among both resources and challenges. To validate the interpretations, the first author engaged the other authors in a dialogue throughout the process. Text segments typical for each category were selected for validation. Following this, cross-validation of the interpretations was done by discussing the units of analyses. Some unclear text segments were discussed by the authors, until an agreement was reached, and the text segments could further be categorized into one of the final categories. Further, in the cross-validation process, the names of some of the themes in the final step of the analyses were discussed and redefined. A dialogic reliability check was done between the three authors to check the supervisory interviews with several rounds of readings of the interpretations throughout the whole analysis process. Figure 5 illustrates the different processes of analysis of the supervisory interviews.

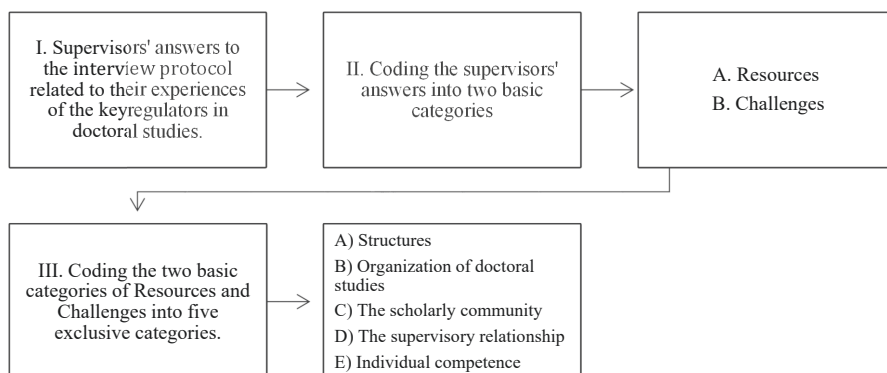


Figure 5. The analysis process in the supervisor interviews (Part-study I)

4.5.2 ANALYSIS OF THE DOCTORAL EXPERIENCE SURVEY

To gain an understanding of the doctoral students' experiences of supervisory support and researcher community support and to gain more knowledge of how the support they experienced related to their experiences of burnout, a set of quantitative analyses were made using SPSS versions 22–24. First, Independent Samples T-tests were used to examine students' perceptions of the significance of the different supervisory sources and the relationships between gender, prolonging of the studies, attrition intentions, study status and thesis format. Further, Chi-square tests were carried out to analyse how doctoral students perceive both the role of different actors in supervision, and the relationship between frequency in supervision with gender, prolonging the studies, attrition intentions, study status and thesis format.

Additionally, data analysis included explorative factor analysis (EFA) based on principal component and promax rotation. The factor structure revealed three factors related to doctoral students' experiences of support in the socially-embedded nested learning environment, namely Supervisory support, Researcher community support, and Equality in the researcher community. The Cronbach's Alphas measuring the internal consistency of the subscales were good (Supervisory support, $\alpha = .884$, Researcher community support, $\alpha = .758$ and Equality of the researcher community support, $\alpha = .801$) and the data fitted the principal component analyses well (KMO = .908, Bartlett's test = .000). Communalities were between .504 and .958, and three factors explained 55 per cent of the variance. Sum variables were formed based on the factors. Following these analyses, satisfaction with support experiences (e.g., the supervisory support, the researcher community support and equality in the researcher community experiences), was examined by using T-tests and Cohen's d for effect size (Cohen, 1992). An illustration of the model of analysis entailing the

4. Methods

sum variables of Supervisory support, Researcher community support, and Equality in the researcher community in association to doctoral students' experiences of satisfaction is shown in

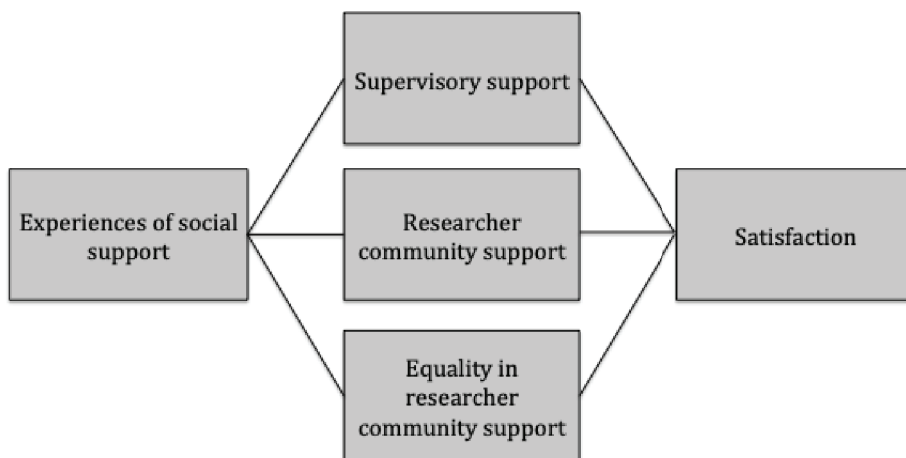


Figure 6. The model for analysis of Supervisory support, Researcher community support, and Equality in the researcher community in association with satisfaction in doctoral studies (Part-study II).

Furthermore, to explore the students' experiences of burnout in doctoral studies, a combination of several measures was used. A principal component analysis with varimax rotation resulted in the expected factor structure. Based on the two factors, Exhaustion and Cynicism were compiled for further analysis. The Cronbach's Alphas measuring the internal consistency for the Exhaustion ($\alpha = .791$) and Cynicism ($\alpha = .743$) scales were satisfactory. The two factors explained 53 per cent of the total variance. The communalities were between .563 and .921. Satisfaction with supervisory experiences and the association with burnout (e.g. experienced stress, exhaustion and cynicism) were examined by using T-tests and Cohen's d for effect size (Cohen, 1992). An illustration of the model for analysis for doctoral students' students' experiences of burnout experiences in association to their satisfaction in their doctoral studies is shown in Figure 7.

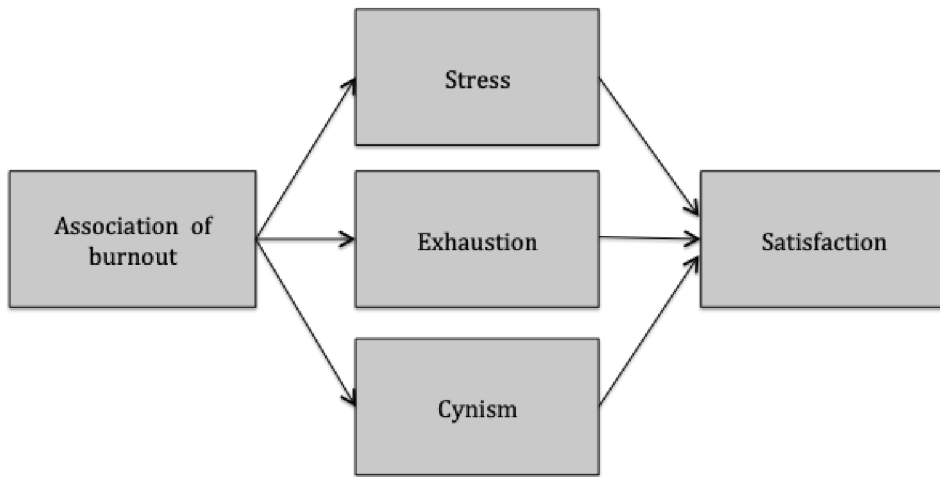


Figure 7. The model for analysis of doctoral students' experiences of burnout in association with experiences of satisfaction in their studies (Part-study II).

The analyses continued by investigation of bivariate correlations between perceived supervisory support scores and perceived burnout scores. These variables were measured using Pearson's r . Finally, a single dependent sum variable for burnout was created for the multiple regression analysis. The objective was to interpret the relationship between statistically significant predictors and burnout.

4.5.3 ANALYSIS OF THE CROSS-CULTURAL DOCTORAL EXPERIENCE SURVEY

The Cross-Cultural Doctoral Experience Survey (Pyhältö et al., 2009; 2015) was utilized as a certain kind of mixed method design, namely the convergent mixed methods design (Creswell & Clark, 2011), to capture cross-cultural variations in doctoral students' experienced researcher community and supervisory support and associated attributes. Hence, both quantitative and qualitative methods were explored. To begin with, a series of exploratory factor analyses (EFA) were conducted. The underlying factor structure of the supervisory and researcher community support scales used the ML (maximum likelihood) extraction method with both varimax and direct oblimin rotations. Subsequently, separate EFA models were created using the Danish and Finnish sub-samples with the same scales to examine differences in factorial structures between nationalities. Accordingly, the results suggested that three factors in supervisory and researcher community support scale

(Supervisory support, Researcher community support, and Destructive friction) should be retained. The three factors explained 45.13% of the variance. In the second phase, the relationship between the supervisory and researcher community support and other variables were examined with Independent sample t-tests, one-way analysis of variance with subsequent post hoc tests and Chi-square tests.

The key doctoral experiences described in the open-ended responses were analysed through content analysis (Brinkman & Kvale, 2014; Miles & Huberman, 1994; Saldana, 2016) with an abductive strategy (Coffey & Atkinson, 1996; Levin-Rosaliz, 2004; Morgan, 2007). The goal of the chosen approach was to maintain a constant dialogue between the empirical data and prior theoretical understandings (Coffey & Atkinson, 1996; Levin-Rosaliz, 2004; Morgan, 2007) in order to identify doctoral students' positive or negative key experiences in doctoral studies. The analysis of the open-ended answers included three complementary phases. During the first phase, all the positive and negative key experiences in which PhD students described interactions within the academic community were coded into two exclusives: (1) Supervisory Interaction and (2) Researcher Community interaction categories. After this, the experiences were coded into three support categories based on the form of support described in the episode: Emotional support, Informational support and Instrumental support, depending on the primary form of support described in the event. Moreover, all the experiences were further coded into two exclusive categories based on the support fit described: matched support, including descriptions of satisfactory support and the form of support that was provided, and mismatched support, including descriptions of provided unsatisfactory support or lack of support in the key experiences. To conclude the analyses, the differences between the cross-national contexts on support fit were examined with Chi-square tests. Figure 8 shows an overview of the analysis process of the open-ended answers in *the Cross-Cultural Doctoral Experience Survey* (Pyhältö et al., 2009; 2015).

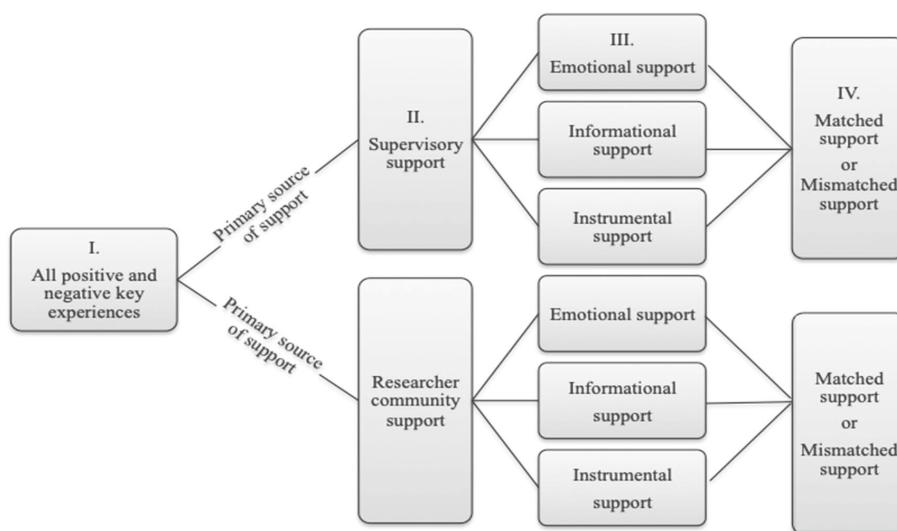


Figure 8. The model for analysis of key experiences in the open-ended answers (Part-study III).

4.6 RESEARCH ETHICS

The fundamental principles of research integrity (The European Code of Conduct in Research Integrity, ESF/ALLEA (2017); Finnish Advisory Board on Research Integrity, (2012); Ministry of Higher Education and Science in Denmark (2014) have been respected in this study. In harmony with both the Finnish and Danish ethical guidelines for conducting research, no approval by ethical committees was needed (cf. Finnish Advisory Board on Research Integrity, 2009; Ministry of Higher Education and Science in Denmark, 2014). This research did not involve intervention in the physical integrity of research participants, deviate from the principle of informed consent, involve participants under the age of 15 being studied without parental consent, expose participants to exceptionally strong stimuli, cause long-term mental harm beyond the risks encountered in normal life, or signify a security risk to subjects (cf. Finnish Advisory Board on Research Integrity, 2009). Participation in the three part-studies was voluntary and based on informed consent. All the participants received written information about the project and gave their consent to participate. Participants had the right to decline participation in the research or to withdraw from the research at any time without consequences. The data were handled confidentially. The data sets were anonymous to begin with (surveys) or anonymized (interview data) to protect participants' identities. This was particularly essential with the interview data where the risk of identification was more present than in the survey data. Ethical aspects related to the study of a

participants of a minority (Part-study I and Part-study II) are discussed in Chapter 6.1.2. Moreover, no incentives were used in the three part-studies. The data in the part-studies were stored behind several passwords and only the researchers had access to the research data. The author of this dissertation was responsible for all the three part-studies. In Part-study I and Part-study II she designed the studies and the data collections, she collected the data and analysed the research data, she reported the results of the analysis and she wrote the articles with assistance from her supervisors. In Part-study III, the author participated in designing the data collection, she was responsible for analysing the qualitative cross-cultural data sets and for reporting the results of the qualitative analysis. She was also responsible for the whole text writing process in the published article with assistance from her co-authors.

4.7 SUMMARY OF METHODS

To reach the goal of this research and to present answers to the research questions from several angles (Creswell 2014; Johnson & Onwuegbuzie, 2004; Johnson et al., 2007; Onwuegbuzie & Johnson, 2006) the research drew on two sources. First and foremost, it was based on doctoral students' and doctoral supervisors' experiences in a multi-disciplinary context. In addition, differences and similarities between Danish and Finish doctoral students were conducted in a cross-national context. The methodological approach was based on mixed methods. Hence, both quantitative and qualitative data were collected and analysed. The data were collected through interviews and through two doctoral experience surveys. Analyses were conducted using content analysis and statistical analysis. The methodological approach of the three part-studies is presented as an overview in Table 1.

Table 1. Overview of methods in Part-studies I, II and III.

Part-studies	Aim	Participants	Method	Instrument	Analysis	RQ
Part-study I	To explore supervisors' perceptions of key regulators in doctoral education	Supervisors N= 15	Interview	Interviews examining the primary regulators in terms of resources and challenges in doctoral studies.	<ul style="list-style-type: none"> • Qualitative, inductive and deductive content analysis • Quantification of qualitative data • Cross-tabulation 	1
Part-study II	To explore doctoral students' experiences of the relationship various supervisory activities, support sources and the doctoral students' experiences of burnout.	Doctoral students N= 248	Survey	<p>Items measuring primary sources, frequency, overall satisfaction with supervision and a single item on experiences of stress.</p> <p>A scale measuring supervisory support, researcher community support and equity in researcher community.</p> <p>A scale measuring exhaustion and cynicism and a single sum variable for burnout.</p>	<ul style="list-style-type: none"> • Quantitative analyses: • T-tests and Cohen's d used for effect size, • Chi-square tests, • Bivariate correlation test using Pearson's r, • Multiple regression analyses. 	2, 3
Part-study III	To explore doctoral students' experiences of researcher community and supervisory support, forms and support fit in a cross-cultural context.	Doctoral students N= 381	Survey	A scale measuring supervisory support, researcher community support and friction.	<p>Quantitative analyses:</p> <ul style="list-style-type: none"> • T-tests and Chi-square tests. • Qualitative, abductive content analysis of the answers to open-ended questions • Quantification of qualitative data • Cross-tabulation and Chi-square tests 	3

5 RESULTS

Social support is first approached from the perspective of supervisors. Their perceptions of resources and challenges as key regulators at different systemic levels are viewed in the context of doctoral education as a socially-embedded nested system. By contrast, doctoral students' experiences of supervisory support and researcher community support are presented in relation to perceptions of satisfaction and experiences of burnout. Experiences of supervisory and researcher community support, various forms of support and support fit are further extended to a comparison between Finnish and Danish doctoral students.

5.1 KEY REGULATORS OF SOCIAL SUPPORT IN DOCTORAL EDUCATION (PART-STUDY I)

The supervisory interview study focused on doctoral supervisors' understanding of key regulators of social support contributing to doctoral studies. The supervisors identified ways in which the key regulators operate in terms of resources invested and the challenges of completing doctoral studies. Yet, resources and challenges may be different in different surroundings in the educational context.

Initially, the results showed variations in the supervisors' perceptions of the core key regulators in the completing of a doctoral dissertation. Secondly, the resources ($n = 97$) and challenges ($n = 120$) that the supervisors described were related to 1) Structures (organizational), 2) The organization of doctoral education, 3) The scholarly community, 4) Supervisory relationship, and 5) Doctoral students' individual competence. Thirdly, the identified conceptions of resources ranged from the supervisory relationship, such as learning with the students to the social support of the scholarly community, such as receiving help from their own research group, international networking and co-operation within the research context. In turn, the supervisors connected the perceived challenges to structures in doctoral studies, such as financial or administrative issues. In addition, the supervisors perceived the lack of a systematic doctoral education process as a challenge. Moreover, the supervisors emphasized students' individual competence (generic and research specific competencies) almost evenly as both a resource and a challenge.

The supervisors related positive aspects of the identified resources to the *scholarly community*. In 29 %) of all the perceived resources were supervisors emphasised the significance of a research group for the students, and the social support a team offers. One supervisor explained that the scholarly community as

a source of support is important to prevent doctoral students from being isolated or being left to their own devices:

In the research group, and we have a big one, we have this feeling of being together. The students receive support from each other, though it is not always me who is around to supervise. No, but there is somebody else to give support, for example, a post doc or a student in the last part of their doctoral study process and so on...and this I think is the most important thing. They should not be left alone with perhaps a feeling of being a burden on the supervisor. (Supervisor I)

The supervisors did not perceive the scholarly community only as an internal resource. They identified international cooperation altogether, including partnerships and collaboration with colleagues in the other Nordic countries, as significant resources within the scholarly community.

Supervisors emphasised *the supervisory relationship* integrated in the theses process as a major resource (23% of resources). They identified networking and interaction among supervisors, their own supervising competence and its systematic implementation in the doctoral studies as resources. These were also regarded important in supervision practices. The supervisors also shared their thoughts about the feelings of inspiration and joy that they feel when they have an opportunity to encourage the students. They emphasized that a trustful relationship with doctoral students was a resource and this entailed a responsibility of offering supervision on a frequent and a regular basis.

You have to be sure that the doctoral education is an ongoing process. You have a huge responsibility and there are many things that contribute to success, and, also many things that can go wrong. So, you just have to be there. The doctoral students must know that the supervisor is always there for them as in the process. (Supervisor G).

The supervisors further highlighted the *organization of doctoral education* as an essential resource (20%). They mentioned a transparent intake of doctoral students. They also reflected on the significance of well-organized research groups in which doctoral students can take part. When the structure of doctoral education is developed, it also enables enhancement of the doctoral students' individual competence. Hence, the supervisors mentioned both generic and research-specific *individual competence* as a core resource (19%). They mentioned generic competence (14%), in terms of language skills, pedagogical expertise and the competence of research ethics as crucial to learn and develop as part of the doctoral trajectory. Finally, the *Structures* theme, entailing funding, infrastructure and physical facilities, was less

frequently mentioned (9%), though the supervisors mentioned external funding as a resource. Doctoral education in Finland is mainly publicly funded, but private sector funding for doctoral education has increased. Financial resources for doctoral education continue to be scarce.

The supervisors perceived slightly more key regulators identifying challenges in doctoral studies (see Table 2). The perceived challenges varied from insufficient funding to limited research-specific competencies. *Structures*, as a key regulator, were more frequently regarded as a challenge than as a resource. Almost one-third (30%) of the perceived challenges were associated with structures such as a shortage of proper physical facilities for the doctoral students, infrastructure, the lack of full-time study opportunities and an insecure financial situation. In addition, the shortage of funding was related to worries about extra bureaucracy resulting in time allocation pressure for the supervisors:

The most serious problem is always that the doctoral students who have funding for only a short period run out of money. Then what? The doctoral students have to apply for funding from different sources, and I have to write a lot of recommendations. And really, a lot of energy is consumed on this, you know... (Supervisor L)

The supervisors further stressed *the organisation of the doctoral studies* as an obstacle in the thesis process (25%). More generally, the supervisors worried about a lack of structure in doctoral studies. The concerns included, for example, supervisors' perceptions of a lack of organized courses, especially in the Swedish language. Further, the supervisors showed dissatisfaction with the recruitment for admission to doctoral studies. They saw a risk that, because of the tight competition for taking up doctoral studies and gaining salaried doctoral positions, there might be a future shortage of doctoral candidates interested in working in academia. According to the supervisors, the result might be that the future academic regrowth among Swedish-speaking Finns would be insufficient. Hence, some of the supervisors expressed concerns about the declining number of Swedish-speaking academics:

The dilemma of the minority group is that the number of students being accepted is so small...Well, this year, two (Swedish-speaking) people will complete their studies in my field, but..., then there might be a gap of at least three years before another (Swedish-speaking) person will graduate. This means that the number is really low, and...if you have chosen the wrong person, we are dealing with a catastrophe. (Supervisor J)

At the same time, as a result of inadequate organisation of the studies, the supervisors identified challenges in their doctoral students’ *individual competence* (23%). They especially perceived academic writing and language skills as impediments in the thesis process. Writing is an essential part of the doctoral study process because the product, the doctoral dissertation, is in focus. The supervisors emphasized the need for writing competence:

You could say that it is kind of a tender spot in our field that there are many students who are very good when it comes to substance, but they have difficulties with writing. That’s the way it is. It is a competency that is not always that strong. There are some exceptions, but generally it is a challenge and we see doctoral students with very good writing skills less often. (Supervisor B)

The supervisors further explained that the language of the dissertation might be the second, or even the third language of the student, so writing academic texts is mostly done in English, which is not the mother tongue of the student, and sometimes causes challenges. One supervisor shared:

They could write better English. Some of the students manage well, but sometimes they really have to rewrite a lot so that the text is understandable before it is ready for language revision. I think that their job would so much easier if their English language competence was better at the beginning of their studies. (Supervisor O).

Accordingly, the claims on both writing skills and the language competence are high. Finally, the supervisors identified the *supervisory relationship* (13%) and the broader *scholarly community* (9%) less frequently as challenges. Descriptive statistics are reported in Table 2 to provide an overview of the resources and challenges reported by the supervisors.

Table 2. Resources and challenges in doctoral studies; frequencies and percentages.

Subcategories	Resources f (%)	Challenges f (%)	Total f (%)
Structures	9 (9)	36 (30)	45 (21)
Organization of doctoral education	19 (20)	30 (25)	49 (22)
The scholarly community	28 (29)	11 (9)	39 (18)
Supervisory relationship	22 (23)	15 (13)	37 (17)
Individual competencies	19 (19)	28 (23)	47 (22)
Total	97 (45) (100%)	120 (55) (100%)	217

In sum, the most frequently perceived resources by the supervisors were the scholarly community and the supervisory relationship. At the same time, the scholarly community and the supervisory relationship were seldom perceived as challenges. On the other hand, the supervisors defined structural matters at the institutional level, as the most common challenge in the doctoral process. Further, with the order reversed, structural matters were seldom identified as a resource.

Based on the supervisors' perceived resources and challenges, it was possible to identify the levels at which the core resources and challenges operate in the socially-embedded nested system of doctoral education. Based on supervisors' perceptions about resources and challenges in doctoral education, it is possible to recognize the consequences that the perceived resources and challenges may have for doctoral education. The emphasized resources are associated with social support in the micro level communities, meaning in research teams and in the student-supervisor relationship. The results highlighted the importance of support from the researcher community. The supervisors emphasised the interaction with international researcher communities as an ingredient of high-quality support and as resources in the doctoral process. From the supervisors' point of view, the student – supervisor relationship was an important resource because supervisors experienced it to be rewarding to learn along with the doctoral students. In turn, the supervisors connected core challenges to various aspects at an institutional level, to the need for more fixed structures in doctoral education. Many of the challenges were associated with structural forms of supervisory work and to the lack of adequate opportunities for doctoral students in developing their competence as their doctoral studies progressed. More than half of the challenges (55%) were for the most part connected with structural elements embedded in the institutional context, mismatched organizational needs in doctoral education and further, to the lack of competence and skills of the doctoral students that should be developed during the doctoral study process. The implication of the results is that many of the challenges require focusing on and developing the whole community in the context of doctoral education, rather than focusing only on individuals.

5.2 THE RELATIONSHIP BETWEEN SUPPORT SOURCES, FORMS AND SUPPORT FIT AND DOCTORAL STUDENTS' EXPERIENCES OF SATISFACTION AND BURNOUT (PART-STUDIES II AND III)

The doctoral experience study (Part-Study II) expanded the understanding of social support in doctoral education by exploring the primary sources of support, namely supervisory support and researcher community support. In addition, the forms of support and support fit were explored. This was done in terms of how doctoral

students' experienced supervisory support, i.e. equality in researcher community support, frequency, and the outcome of these experiences, i.e. satisfaction and stress, exhaustion and cynicism.

First, the results suggested that different supervisory sources and activities contribute to the overall experiences during the doctoral journey and the completion of the study process. However, the significant actors of supervision varied, according to the students. They were most satisfied with the role of the main supervisor in comparison to other sources ($t(240) = -4.11, p < .01$). The second supervisor and the doctoral students' peers were also perceived as important sources of supervisory support (Appendix 4 shows the significance of different actors in the supervision process). The results showed further differences between the doctoral students' in terms of in gender, study pace and thesis format. Students who were writing an article-based dissertation and students whose studies were not prolonged (lasting less than seven years) emphasized their research group as being more important, than those whose doctoral studies had been prolonged ($t(161) = 2.38, p < .05$) and those who were writing monographs ($t(86,379) = 2.36, p < .05$). Female students, on the other hand, underlined the role of the second supervisor ($t(149) = 2.02, p < .05$), peers (their doctoral student colleagues) ($t(179,311) = 2.51, p < .05$) and the other members of the research group ($t(138,279) = 2.32, p < .05$) to be more significant, than the male students did. Second, the results showed variations in terms of how often the students received supervision. It varied from daily supervision to once in six months or less often. This was the case for almost one-third of the students' (30%) who reported that they met with their supervisor once every six months, or less often. In comparison, most of the students (70%), received supervision typically once in two months (30%) and a quarter of the students (26%) reported that they meet up with their supervisor every month. As follows, in terms of frequency of supervision, the results suggest that 85% of the students who received supervisory support on a monthly basis or more often were more satisfied with their supervision than their peers who reported receiving supervision once every second month or less often. Moreover, though the experiences of the quality of social support resources differed, the students were quite satisfied with the social support they received.

Generally, the students' experience was that they received informational support. The informational support was presented with a constructive attitude. In addition, they acknowledged different support forms from the researcher community indicating that emotional support was received in terms of acceptance and appreciation in the research community. The doctoral students also felt that they were treated equally in the research community, because they experienced collegiality, justice and fair treatment from their peers. Further, doctoral students who expressed high levels of support from the researcher community, perceived high levels of supervisory support, and had a sense of being equally treated, reported that they were significantly more satisfied with their supervision than their peers

who received less support from the above-mentioned sources (see Table 3). The results implied that the different supervisory sources and activities contribute to the satisfaction in the doctoral study process.

Table 3. Means and standard deviations (SDs) for Supervisory support, Researcher community support and Equality in the research community among students who reported being satisfied with the supervision they received and those who were not satisfied.

Scale	Satisfied	Not satisfied	<i>t</i> (<i>df</i>)	<i>p</i>	effect (<i>d</i>)
Supervisory support	3.74	3.33	4.066 (139,246)	.000	medium (.569)
Researcher community support	3.72	3.28	4.212 (139,246)	.000	medium (.582)
Equality in the research community	3.71	3.03	-6.273 (134,202)	.000	large (.875)

The results also showed that the students' perceptions of stress, exhaustion and cynicism (i.e. burnout) in combination with their experiences of different supervisory sources and activities were related. A high degree of integration into the research community, and collective forms of supervision, were associated with a reduced risk of burnout. In addition, drop-out intentions and high stress levels were associated ($t(245) = 3.18, p = .002$), meaning that those students who had considered interrupting their doctoral studies reported higher stress levels in the recent past compared to those who had not harboured such thoughts. Consequently, reduced levels of satisfaction with supervision were also associated with experienced stress, exhaustion and cynicism (see Table 4).

Table 4. Means and standard deviations (SDs) for stress, exhaustion and cynicism among students who were satisfied with their supervisory support and those who were not; effect sizes measured with Cohen's *d*.

Items	Satisfied	Not satisfied	<i>t</i> (<i>df</i>)	<i>p</i>	Effect
Stress (single item)	3.46	3.77	2.033 (246)	.043	small (.288)
Exhaustion	2.66	3.05	3.447 (161.947)	.001	small – medium (.461)
Cynicism	2.15	2.60	3.524 (127.671)	.001	small – medium (.497)

Accordingly, the results indicated that the likelihood of interrupting doctoral studies increased among those with experiences of burnout. Considerations of interrupting doctoral studies was the strongest predicting variable in the model and accounted for 11.2 per cent of the variance in burnout they experienced ($R^2_{adj} = .220$). Moreover, students who received more frequent supervision and were more satisfied with it, and those who felt they were equally treated within the researcher community had a reduced risk of experiencing burnout. The form of the thesis was also related to burnout, with those writing an article-based thesis being less at risk (see Figure 9). Appendix 5 shows the multiple regression analyses with study-related burnout as the dependent variable.

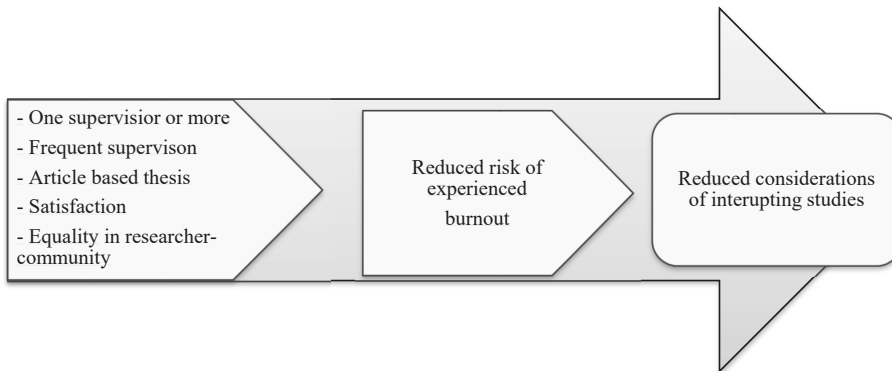


Figure 9. Doctoral students' experiences of and satisfaction with supervision related to their experiences of study related burnout.

In sum, the results from the doctoral experience survey revealed that various key factors significantly relate to experiences of burnout. The results imply that the sources of social support, the quantity of supervision and a sense of equality in research communities are essential key factors in the socially-embedded system provided by doctoral education. In addition, doctoral students' experiences of satisfaction with the provided support are central key factors in the socially-embedded system for preventing experiences of stress, exhaustion and cynicism among doctoral students.

5.3 CROSS-CULTURAL VARIATION OF SUPERVISORY SUPPORT AND RESEARCHER COMMUNITY SUPPORT EXPERIENCES, FACTORS ASSOCIATED WITH THE SUPPORT EXPERIENCES AND PERCEIVED SUPPORT FIT (PART-STUDY III)

The cross-cultural doctoral experience study (Part-study III) examined Danish and Finnish doctoral students' key experiences of social support in a cross-cultural setting. The focus was on experiences of research community and supervisory support, the form of support needed and how the doctoral students' key experiences match or mismatch with the provided support.

The results showed that both Danish and Finnish doctoral students emphasized the source of researcher community support over supervisory support. Researcher community support constituted of usually informal support and feedback provided by their own research team, peers and other members of the department, and, interaction with international networks. Supervisory support, on the other hand, was related to the main supervisor or the co-supervisors. The Danish students

reported higher levels of researcher community support ($M = 4.74$, $SD = 1.22$) and lower levels of friction experienced ($M = 2.14$, $SD = .90$) than the Finnish doctoral students did. The results suggest that there were also differences in how the Danish and Finnish doctoral students experienced other attributes, such as thesis format, research group status, study status, intentions to interrupt studies, and engagement in international research activities. Firstly, article-based dissertations ($\chi^2 (1, 334) = 5.91$, $p < .05$) were slightly more common among the Finnish PhD students than among the Danish ones. Danish doctoral students were more likely to work full-time on their doctoral research than their Finnish counterparts ($\chi^2 (1, 349) = 39.66$, $p < .001$). Furthermore, the Danish students also had more experience engaging in international research collaborations including co-authoring with international researchers ($\chi^2 (1, 351) = 4.26$, $p < .05$), participating in international courses ($\chi^2 (1, 351) = 20.45$, $p < .001$) and researcher exchange ($\chi^2 (1, 350) = 100.42$, $p < .001$) than the Finnish doctoral students had. Finally, only a small proportion of the Finnish participants had spent time abroad during the thesis process, while over half (52.8%) of the Danish students reported that they had benefitted from an international research exchange period. Appendix 6 shows the statistical results of various support sources and other attributes reported by the Danish and the Finnish doctoral students. Further, the results suggested that several variables were related to the researcher community support they experienced. For example, students working full-time experienced more researcher community support than students working part-time ($t(328) = 3.42$, $p < .01$) and the students who worked mainly in a team or as much on their own as in a team, experienced more researcher community support than students working mainly on their own ($p < .001$ and $p < .01$). Moreover the thesis format was also related to experiences of more researcher community support, because doctoral students writing an article-based dissertation experienced more researcher community support than the students preparing their thesis in the form of a monograph ($t(231.22) = -3.92$, $p < .001$). To conclude, study status, thesis format and researcher group status influenced the experiences of researcher community support.

In both Denmark and Finland, more participants emphasized researcher community support (73%) over supervisory support (27%) when doctoral students reported on key experiences during the doctoral journey. The Danish students perceived high numbers (81%) of key experiences that were related to researcher community support. In comparison, the Finnish students described 69% of the support incidents associated with researcher community support. When it comes to the three forms of support, the results indicated further that the proportions were quite balanced. However, the students reported the form of *instrumental support* as the most frequent form (41%) of help they received in their study process. Instrumental support consisted of experiences and issues on funding, time allocated to the doctoral research, materials, equipment, network support, and a fair division

of work and duties within a research group. A doctoral student from Denmark illustrated this as follows:

I published a book as the editor with another PhD student. We got a lot of support from our research program, which resulted in a seminar and a publication of the seminar. It was a long process, but it was a very educational process for me, and I guess I believe more in myself after we succeeded (in all the aspects: getting support from colleagues, organizing the seminar, receiving funding, preparing the articles).

About one-third of the students' key experiences (31%) were associated with support regarding *informational support*. The students' described receiving advice on the thesis work, and feedback on the writing process. Hence, informational support included expertise, suggestions and help to navigate the organization and institutional set-up that enables a doctoral student to cope with the problems they face during their study process. As shared by a Finnish doctoral student:

I got feedback from the members in my research group on my own idea. The idea was mine, though. The members of the research group didn't reflect on the matter in the same way and, therefore, I got encouragement to bring out and write about my idea in a future article.

The doctoral students reported incidents related to *emotional support* least often (28%). Emotional support entailed descriptions of trust, empathy and caring, listening and showing interest, approval and a sense of belonging.

When writing my master's thesis, my supervisor saw my abilities. Against all odds, a highly skilled professor believed in my opportunities. I got a lot of devotional energy from that fact. (Finnish PhD student)

The results suggested further that Danish students perceived slightly both more informational support (34%) and emotional support (29%), than their colleagues from Finland (informational support, 29% and emotional support, 27%). The Finnish doctoral students, on the contrary, stressed instrumental support (44%) somewhat more than the Danish doctoral students (37%). Appendix 7 shows the support forms reported by the Danish and Finnish students.

The results indicated that the fit between the support needed and provided varied between the two countries. Matched support refers to experiences in which the doctoral students described that they received the form of support they needed. In turn, mismatched support included students' descriptions of lack of support, such as feelings of exclusion when the needs of the researcher community or supervisory

interaction was not fulfilled. To begin with, it was shown that the PhD students' descriptions were almost equally distributed. Half of the incidents reported by the PhD students were associated with matched support and half of the incidents with mismatched support. Matched support incidents were characterized by satisfaction with the support, whereas accordingly, mismatched support incidents were characterized by dissatisfaction or a lack of support. However, the only form of support in which the students reported higher frequency of matched support than mismatched support was informational support (38%). Typically, they stated that the informational support being provided in the form of expertise, guidance and feedback related to research work and thesis contents being available, helped them to stay on track in their study process. A Danish participant described the feedback and help regarding the research work as follows:

I talked to my supervisor after worrying about where things were going and found out that things were going as could be expected. This was important to me because, before that I had a lot of worries, and now I feel relieved.

In comparison, the students reported more mismatched (46%) than matched instrumental support incidents (37%), including dissatisfaction with time, funding, courses, materials, data, equipment, networks and collaborators. A Finnish doctoral student described insufficient instrumental support in the following way:

I did not get a doctoral position (though I applied for it) two years in a row. I was shortlisted both times. I understood that my own plans could be ruined by an opinion of only one reviewer. I felt deeply vexed.

Mismatched support (30%) was more common in emotional support. Mismatched emotional support entailing a lack of encouragement and trust, lack of shown interest by supervisor, and the lacking sense of belonging, was reported more frequently than matched emotional support (25%). A Danish doctoral student described such an experience in the following way:

I started losing interest in my research. I could not see how anyone was ever going to care. I found that I was stressed by the ever-changing requirements. Furthermore, things started to look more and more grim for our future careers at the university. I began to feel very downhearted. I started to question why I was doing my research and for whom. Was I actually doing myself a disservice continuing, as the jobs I thought I wanted weren't there, and the jobs outside university wouldn't care whether or not I had a PhD.

Moreover, the Danish students reported slightly more matched support (51%), than the Finnish students (49%).

To conclude, for both groups of PhD students, the type of matched informational support was the most frequently reported form of support. However, the form of support that the students’ perceived that was not available and did not match differed between the groups. Hence, the PhD students in Denmark described most frequently feelings of disappointment and a sense of uncertainty about the future, e.g. the form of mismatched emotional support (59%). Finnish students, on the other hand, reported the highest amount of mismatched support, in instrumental support (58%), (which is almost the same proportion for the Danish students in their descriptions of lack of emotional support). The Finnish students reported a lack of support in academic leadership, the accelerating competition for funding and the challenges with short-term scholarships. Finally, there were no statistically significant differences between the Finnish and Danish students’ perceptions of the relationship between needed versus provided support in the key experiences. Figure 10 illustrates the cross-cultural variation in the expressed support forms and support fit. Appendix 8 shows the specific numbers of doctoral students’ perceptions of matched and mismatched support in the cross-cultural context.

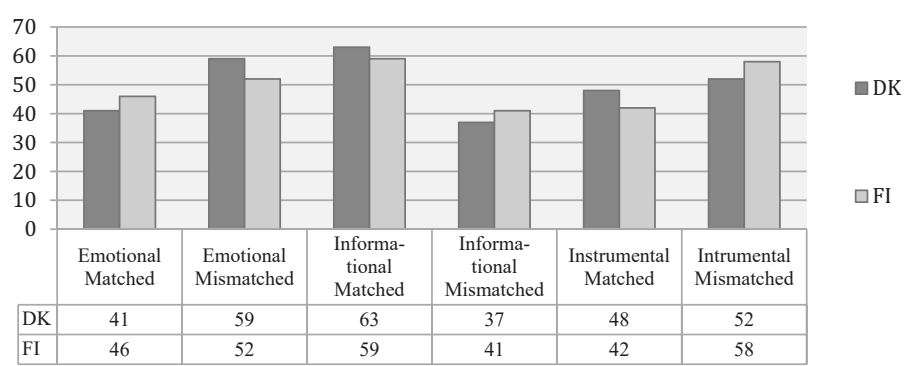


Figure 10. Support fit in the key experiences for Danish (DK) and Finnish (FI) doctoral students (%).

The cross-cultural investigation highlighted support fit as an ingredient in the anatomy of the Supervisory Support and Researcher community support–model.

5.4 SUMMARY OF THE RESULTS

The aim of this research was to advance the understanding of doctoral education as a socially-embedded nested system, namely, the sources of support, (supervisory support and researcher community support), different forms of support, and support fit. The research contributed by adding knowledge on how doctoral students' experiences of the social support they received is associated with their experiences of satisfaction and experiences of burnout. This research expanded knowledge of doctoral students' experiences of support sources, forms of support and support fit embedded in two different national contexts, Denmark and Finland. Key findings of this research are summarized in Table 5.

Table 5. Summary of key findings.

<p>How do doctoral supervisors perceive resources and challenges of doctoral studies provided by the socially-embedded nested system of doctoral education, and which levels of the system the resources and challenges identified by the supervisors are located?</p>	<p>Most of the resources emphasized by the supervisors were recognized as social aspects, meaning that the supervisors underlined the social interaction available and utilized in the doctoral education context. As primary challenges in the doctoral study process, the supervisors underlined aspects related to the <i>institutional</i> level.</p> <ul style="list-style-type: none"> • The perceived resources in the doctoral study process were mostly related to the <i>scholarly community</i> and <i>the supervisory relationship</i>. The supervisors associated the resources aligned with the primary source of supervisory support and researcher community support. • Most of the challenges were associated with the lack of instrumental forms of support in the institutional context. The challenges were connected to, for instance, doctoral students' lack of enough time and funding, supervisors' experiences of the need of more fixed structures in doctoral education, and, to the lack of enough opportunities for doctoral students to develop their competencies during the doctoral study process.
<p>How do doctoral students' experience a) sources in terms of supervisory and researcher community support, b) perceived forms of the support and c) experienced support fit in terms of supervision are related to their experiences of satisfaction and burnout?</p>	<p>Doctoral students in a multi-disciplinary context benefitted from having several and various sources of supervision. Collective forms of supervision were related to reduced risks of students experiencing burnout.</p> <ul style="list-style-type: none"> • Doctoral students' experiences of different supervisory sources (e.g. both the supervisory support and researcher community support), equal treatment and satisfaction with supervisory support contribute to the overall experiences of the doctoral journey and the completion of the study process. • The results suggested that students experienced support fit in terms of support frequency, a sense of equality in researcher community support, satisfaction and form of thesis. Namely, students', who received more frequent supervision were more satisfied with the support, and those who felt they were equally treated within the researcher community and students writing an article-based thesis had a reduced risk of experiencing burnout. • Various sources of support, different forms of support and support fit are, thus, associated with doctoral students' experiences of satisfaction and experiences of burnout in doctoral studies.
<p>What differences and similarities can be detected between Danish and Finnish doctoral students' experiences on supervisory and researcher community support, perceived support forms and support fit experiences?</p>	<p>Depending on the national context, social support was received in various forms with different emphasis in the various forms, though the disciplinary context is the same. The results indicated both similarities and differences between the national contexts.</p> <p>Similarities</p> <ul style="list-style-type: none"> • Both Danish and Finnish doctoral students emphasized the form of researcher community support over supervisory support. • Students reported, generally, low levels of friction in support. • Both groups of PhD students reported the type of <i>matched informational</i> support most frequently. • The only form of support in which the students in Finland and Denmark expressed <i>more matched support than mismatched support was informational support</i>. <p>Differences</p> <ul style="list-style-type: none"> • The Danish students perceived more <i>informational</i> support and <i>emotional</i> support. In addition, <i>mismatched emotional support</i> was most frequently described in the Danish context. • The Finnish doctoral students, on the contrary, reported <i>instrumental</i> support more often than the Danish doctoral students did, and, they also reported the <i>highest amount of mismatched support in instrumental</i> support. • The results imply that there are differences embedded in the study status of doctoral students and cultural norms in the Danish and Finnish doctoral education systems.

6 DISCUSSION

6.1 METHODOLOGICAL AND ETHICAL REFLECTIONS

In this study, the mixed methods design (cf. Creswell & Plano Clark, 2018; Johnson & Onwuegbuzie, 2004; Johnson et al., 2007; Onwuegbuzie & Johnson, 2006; Teddlie & Taschakkori, 2009) was adopted in order to explore the social support system provided by doctoral education. The design construction was determined by the research questions (Creswell, 2014; Johnson & Onwuegbuzie, 2004). The mixed methods design was realized through combining the qualitative and quantitative data and via analyses of three separate datasets. The supervisory interviews identified the resources and challenges at different organizational levels and formed the first dataset (Part-study I). Via both the doctoral experience survey and the cross-cultural doctoral experience survey, the understanding of key findings the socially-embedded support system provided by doctoral education was advanced and accumulated. The three part-studies provided a multifaceted understanding on the socially-embedded support system of doctoral education by focusing on different aspects of it. Accordingly, combining qualitative and quantitative methods offered several perspectives of the system of social support. Focusing both on the meaning (i.e. qualitative methods) and on connections between the social structures (i.e. quantitative methods), a complex picture of the socially-embedded support system in doctoral education (Creswell, 2008) was gained. The mixed method approach acknowledges the choices of methods to gain and obtain a deeper understanding of the broad picture in the most sensible and logical way (Creswell, 2008; Johnson et al, 2007). The validity and reliability of the mixed method approach can be assessed in terms of *Inference quality*. Inference quality entails two complementary dimensions: *design quality* and *interpretive rigor* (e.g. ensuring the explanatory exactness) (Teddlie & Tachakkori, 2009). Additionally, the evaluation of mixed methods can be done through *inference transferability*, which refers to the generalizability of the results (Teddlie & Taschakkori, 2009).

The *design quality* in this study was achieved by using both qualitative and quantitative approaches as a tool for breaking down the complexity of supervisory support and researcher community interaction. The research design was built on a sample from different individuals from populations. Moreover, the sample represented multi-disciplinary, experienced supervisors' and doctoral students' perceptions of supervisory experiences in the socially- embedded nested system provided by doctoral education. The data entailed 629 doctoral students and 15 supervisors, who gave their individual experiences on supervisory support and researcher community support and different aspects related to the socially-embedded

support system. By collecting data from five institutions in two countries, some of the challenges of single institutions may have been avoided. The selection of the multi-level mixed sub-samples from the five universities connected by the context of doctoral education provided an opportunity to view doctoral student learning interactions within their learning environments in a broad scope. Accordingly, the research benefitted from the use of datasets and samples that supplemented each other. The data collection was located at two levels in the socially-embedded nested support system provided by the doctoral education: at the supervisor-student level, and at the individual doctoral student level. In order to answer the research questions, the use of the chosen data collection strategy led to the exploration of doctoral student participation at different institutional levels provided by the socially-embedded support system. Hence, supervisory interactions were explored from micro level researcher communities to the macro levels realized by institutional policies, and from the viewpoint of the national and a cross-cultural context.

In order to answer the research questions, the three data sets were given equal priority in the analysis and interpretation of the research. The prioritization of notation (Creswell, 2008; 2014) for each part-study is shown in Table 6. Uppercase letters indicate a priority for either the quantitative or qualitative data and, when needed, lowercase letters indicate a lower weight for either quantitative or qualitative data (Creswell, 2008; 2014).

Table 6. Notation used to emphasize the priority given to the mixed method research design and the three part-studies (see Creswell, 2008; 2014).

Part-studies	Mixed method notation
Supervisory interview study (I)	QUAL+ quan
Doctoral Experience Survey (II)	QUAN
Cross-Cultural Experience Survey (III)	QUAN + QUAL

The within-research design consistency (Teddle & Tashakkori, 2009) was good, since the supervisory and researcher community support was analysed in all three part-studies. Exploring the data through the lens of supervisory support and researcher community support across the three part-studies enabled a deepened understanding of the perceptions of social support and factors related to social support in doctoral education. When assessing design quality from the perspective of within-design consistency design, this can be considered to be a strength.

The explanatory exactness of the understanding of the findings, e.g. *interpretative rigour*, was ensured by explaining the analysis strategies and processes that were chosen (Teddle & Tashakkori, 2009). Also, excerpts and examples from the interviews and the open-ended answers are presented in the original articles. Examples of the models for analysing the quantitative results, overall figures and tables for interpreting the results are also presented (see Chapter 4). The

interpretative rigor was further strengthened by reflection of the results in light of existing theories and earlier research literature (see Kvale, 2007; Miles & Huberman, 1994; Teddlie & Tashakkori, 2009). A limitation was the cross-sectional design, which did not allow changes in the supervisors' and the doctoral students' support experiences to be explored. However, the results do offer diagnostic knowledge, e.g. demonstrative features of what guides their experiences of social support in their doctoral journey most and how these experiences guide further actions and success in the process. Moreover, the study did not explore specific experiences of the individual students' different phases in their doctoral journey meaning that the doctoral students' experiences of social support during the doctoral study process were explored at a general level. This should be borne in mind when interpreting the results. Yet, that based on the students' own estimation, we know that over half of the participants in both Part-study II and in Part-study III were in the middle or in the last stage because they had completed two-thirds of their thesis. Thus, a considerable number of the doctoral students had considerable experience of supervisory and researcher community support. In sum, reflecting on design quality in terms of interpretative rigour, this can be considered to be good.

Finally, *the inference transferability* of this study was promoted by the data collection from Finnish doctoral student groups, belonging to both the majority and minority language groups (four universities), and from Danish doctoral students (one university). The participants included doctoral supervisors from three universities and both the students and the supervisors represented different disciplines. The interviews provided a rich data set on the supervisors' perceptions of various aspects of doctoral education. However, the generalizability of the results should be done with caution. The mixed methods design allowed for the exploration of various practices in the complex socially-embedded learning environment provided by doctoral education. Therefore, the results from this research may have transferability for further studies on social support in doctoral education, especially for Swedish-speaking research-intensive universities in Finland. The proper and adequate collection and analyses of both the qualitative and quantitative data and the mixing of the two forms of data contributed to the understanding of different aspects associated with the socially-embedded support in doctoral education. Hence, the appropriateness of the inference transferability in this study was suitable.

6.1.1 METHODOLOGICAL REFLECTION ON THE THREE PART-STUDIES

The supervisory interviews (Part-study I)

The interview data from 15 supervisors were utilized in the first part-study question. An advantage of the supervisory interview data was that it entailed experienced full-time professors from various disciplines with extensive doctoral supervisory experience as doctoral supervisors. The rich thick descriptions from the intentionally selected participants (Creswell & Plano Clark, 2018) were enough to reveal the main key regulators perceived as resources and challenges and to locate these at different systemic levels in doctoral education. Therefore, the generous narratives from the experienced supervisors established trustworthiness in the first part-study (Denzin & Lincoln, 2011). The use of an earlier validated interview protocol increased the validity of the data collected (Löfström & Pyhältö, 2012). In addition, the interview protocol was piloted in order to validate the match to the chosen context. The supervisory interviews were qualitatively content-analysed (e.g. Marshall & Rossman, 1995; Patton, 1990), hence the attention in the analyses is on differences and similarities through codes and categories. The rigorous thematic approach of analyses employed (Braun & Clarke, 2006) increased the validity and consistency of the analysis.

The results of the qualitative analyses in the first study were further quantified to build a broader picture of supervisors' perceptions of resources and challenges in doctoral education. The quantification elaborated further the qualitative results (Creswell, 2008, 2014). However, the frequencies and percentages of the subcategories in the supervisory interviews were reported only to provide an overview of the prevalence of resources and challenges compared to each other. Hence, the intention with reporting descriptive statistics was not to classify the subcategories of resources/challenges as hierarchical to each other, but rather to illustrate the variety of the resources and challenges reported by the supervisors. The supervisory data were collected from three Swedish-speaking research-intensive universities in Finland. The fact that the same categories in the qualitative data from all three institutions were identified indicate that the resources and challenges recognized in the supervisory interviews have importance beyond a single-institutional framework (cf. Kvale, 1997). However, it is important to bear in mind that the intention was not generalizable from the results. A limitation in the analysis of the first part-study was that the categorization in the first phase was solely done by the first author of the manuscript. However, once the initial analysis had been done, all authors engaged in the dialogic reliability checking of the categorizations with a focus on ambiguous segments identified by the first author. In summary, the richness of the qualitative findings of the supervisors provided information about key regulators in terms of resources and challenges in the organizational nature of the support

system in doctoral education provided a deep understanding of the participants' personal perceptions of resources and challenges in doctoral education.

The Doctoral Experience Survey and Cross-Cultural Doctoral Experience Survey (Part-study II and Part-study III)

The two sets of survey data: The *Doctoral Experience Survey* (Pyhältö et al., 2011) and the *Cross-Cultural Doctoral Experience Survey* (Pyhältö et al., 2009; 2015) were utilized in Part-studies II and Part-study III. In the second part-study, the interrelation between supervisory sources, experienced supervisory support and researcher community support and doctoral students' experiences of satisfaction and burnout in their doctoral studies were explored. In the third part-study the different components of support sources, forms, and support fit were analysed with cross-country data. Both surveys have been validated in several contexts for a longer period and both surveys were pilot tested before the data collection for this study. The sizeable quantitative dataset and both sets of survey data were well represented in comparison to the whole population of doctoral students and this may be assessed as a strength from the standpoint of reliability. Further, the representativeness of a range of disciplines at the case universities in Part-study I and Part-study II, and the cross-cultural data sets added trustworthiness to this study, since the use of different datasets and samples supplemented each other.

The reliability of the scales used in both Part-study II and Part-study III can be considered to be enough: In the *Doctoral Experience Survey* the internal consistency of the supervisory subscales in the doctoral experience survey ($\alpha = 0.76 - 0.88$) was good. The internal consistency of the supervisory scales and researcher community scales in the cross-cultural doctoral experience ($\alpha = 0.73 - 0.92$) may also be considered as good. Another strength was the mixed methods utilized in Part-study III. The analyses of the open-ended answers from Danish and Finnish doctoral students strengthens the analytic adequacy. The answers were qualitatively content-analysed (Brinkman & Kvale, 2014; Miles & Huberman, 1994; Saldana, 2016) using an abductive approach (Coffey & Atkinson, 1996; Levin-Rosaliz, 2004; Morgan, 2007). The vigour of the mix methods strategy was increased by analysing supervisory and researcher community support experiences in doctoral students' emotional highs and lows drawing on the Supervisory and Researcher Community support model (Coffey & Atkinson, 1996). Hence, the students had the opportunity to describe the significant positive and negative key events in their own words. The answers from open-ended questions in the cross-cultural survey enabled the doctoral students to bring out the voices of their key experiences, while the theoretical lens allowed making an analytical distinction between the sources, forms and support fit in the PhD trajectory. The open-ended data resulted in a rich understanding of

the rather unique approach of further examination of matched versus unmatched social support. The face validity in this study is supported through reporting and discussing the results with supervisors and doctoral students in both national and international arenas. The results have been presented to new and senior academics attending university pedagogy courses on supervision, in workshops for supervisors aimed at developing supervisory practices, and the results have been accessible to an international audience at several scholarly research conferences.

Furthermore, the check for agreement on categories for Part-study III was done by authors one, two and four. Two of these authors conduct research in Finland and one in Denmark. All authors were engaged in the discussion of interpreting the quantitative and qualitative results in the cross-cultural context. In order to understand how support experiences may be similar or different and what social support experiences rely upon in various contexts, an advantage in this study was the international author team. The international author team provided broad understanding of doctoral education and the specific features of their national context enabled appropriate analyses of the cross-cultural results. In sum, the most important argument for the decision to use the mixed methods approach in this dissertation was that by choosing mixed methods authorized me as an early career researcher to combine different kinds of data in order to answer the research questions. The analytical strategy appeared to be appropriate for providing answers to the research questions and a logical understanding in line with earlier knowledge and research. The discussion about using the mixed methods design should be continued (Creswell & Plano Clark, 2018).

Finally, it is necessary to recognize the role and position of me as a doctoral student in this research, while I have been investigating the social support experiences of other doctoral students in doctoral education. The fact that I have been in the same position as most of the participants in this research can be considered both as a strength and as a challenge. The most important advantage is that I have been able to acknowledge the intellectual and emotional challenges and experiences that doctoral students might face when they are pursuing their doctoral goal. It should be borne in mind that many positive highlights have been recognized in the data during this process and understanding the complex doctoral journey was required in order to interpret the results, especially in the high number of the open-ended answers. So, the background and pre-understanding may be an advantage in qualitative research, since the researcher is familiar with the participants' everyday world (Kvale & Brinkman, 2009). The interviews with the supervisors included a component of power imbalance between the data collector and the participants (Creswell, 2014). Despite this fact, as the data collector, it was important for me to establish an interview situation based on openness and trust, one in which the supervisors felt motivated to discuss and answer interview questions and consider things around the topic of our discussion.

6.1.2 REFLECTIONS ON RESEARCH ETHICS

Protecting the identities of research participants has been a priority, as some of them represent a language minority in Finland and could therefore be identifiable based on information about their field, years in service, and so on. Due to the supervisors' and doctoral students' specific research environments (i.e. Swedish speaking degree programs), both doctoral supervisors and sometimes the doctoral students they have supervised were exposed to a higher-than-usual risk of being identified. The participants who contributed to the supervisor interviews teach and supervise in the context of the universities in Finland having a particular mission to secure forthcoming professionals able to work in Swedish, which is one of Finland's two national languages (Finland's Council of State, 2004). Therefore, to protect the identity of the supervisors, information about them was anonymized and identifying information (such as disciplines) was removed. Also, the identities of doctoral students supervised by the supervisors had to be protected if identifying information was exposed during the interviews.

As with the supervisors, doctoral students in Finland with Swedish as their mother tongue are a small group and special attention had to be paid to protecting their identities as well. In the *Doctoral Experience survey*, responses with frequencies below 5, the fields were described only in general terms (e.g. social sciences). Participants had the right to terminate their involvement at any point, if they wished to do so. Confidentiality was also ensured in data storage. All data have been stored on a University of Helsinki server secured by dual password protection. Co-authors at partner institutions (Part-study III) had access only to data concerning their own institution, and they were also committed to governing the data securely and confidentially.

6.2 RESULTS IN THE LIGHT OF PREVIOUS LITERATURE

Results showed that both Finnish doctoral supervisors and Finnish and Danish doctoral students perceived doctoral education to be a highly socially-embedded nested system. This is in line with previous literature on doctoral experiences and validates the relevance of the social support framework chosen for the study (Lovitts, 2005; McAlpine & Norton, 2006; McAlpine & Åkerlind, 2010).

The first part-study showed that the supervisors identified a variety resources and challenges of the doctoral journey, located at several levels of doctoral education, ranging from the macro to the micro level. Most resources reported were related to social aspects in doctoral education. The finding is in line with earlier studies suggesting that the key determinants of PhD degree completion are embedded in the social landscape of interaction (Ali & Kohun, 2007; Gardner, 2007; 2008;

Jairam & Kahl, 2012; Martinsuo & Turkulainen, 2011; Zhao et al., 2007; Weidman & Stein, 2003). The results further showed that the resources described were typically embedded in the supervisory activities and at the researcher community such as engaging in international researcher communities and networks. The result implies that the supervisors were aware of the powerful role of supervision and the researcher community as a core resource in doctoral studies. Hence, they perceived the potential social support system formed by the researcher community as a resource for promoting doctoral student development and in enhancing study completion. This is in line with earlier research results, suggesting that the academic community gains from having a deep understanding of the importance of social support at the micro level of the doctoral supervisory system (Barnes & Austin, 2009; Gardner, 2007; Golde, 2005; Hopwood, 2010; Ives & Rowley, 2005; Jones, 2013; Stubb et al., 2011; Vekkaila, 2014; Vekkaila et al., 2016, Wisker & Robinson, 2012).

The primary challenges perceived by supervisors were associated with the institutional level, typically the structural elements of supervisory work, such as a lack of structure in doctoral education and a lack of financial resources. These kinds of challenge have also been detected in the earlier research literature (Jones, 2013; Pyhältö et al., 2012c; 2015; Sverdlík, Hull, McAlpine, & Hubbard, 2018). The supervisors also believed it to be necessary to build support for doctoral students to learn and develop both generic and research specific competencies such as language competence and methodological skills during their studies. This has also been called for in previous research and in policy documents (Barnes & Austin, 2009; Castello et al., 2017; Jones, 2013). In summary, the supervisors emphasised the importance of support from themselves and the researcher communities, while the challenges were associated with the institutional level, particularly in terms of developing fixed structures and practices. Recognition of the available resources at all levels in the socially-embedded learning environment provided by the doctoral education can be seen is necessary in order to cope with the acknowledged challenges.

Further investigation showed doctoral students' experiences of social support in terms of support sources (e.g. supervisory support and researcher community support), support forms and support fit were related to doctoral students' experiences of both satisfaction and burnout. The doctoral students' satisfaction with doctoral supervision was associated with having multiple sources of support, implying that the success of the learning process of becoming an academic expert depends significantly on their social interaction within the researcher community. The results further suggested the primary support sources were to be found in micro level researcher communities e.g. in the supervisory relationship, and in research teams. Accordingly, doctoral students benefit from receiving social support from a wide range of actors. The significance of multiple support sources for doctoral students has also been widely reported in earlier research literature (Agné & Mörkenstam, 2018; Dysthe et al., 2006; Gurr 2001; Lee, 2005, 2018; Malfroy, 2005; Kobayashi,

2014; Peltonen et al. 2017; Olmos-López & Sutherland, 2015; Pyhältö et al., 2009; 2012c; Vehviläinen & Löfström, 2014; Vekkaila et al., 2013; Wisker & Claesson, 2013; Skakni, 2018b, Stubb, 2012, and, Åkerlind & McAlpine, 2015).

The students particularly valued the informational and emotional support received from their supervisors and the research teams. Moreover, results on doctoral students' experiences of support fit, i.e. perceiving the social support constructive and aligned with the situation (cf. Pyhältö, 2018), revealed that their experiences of trust and equality were related to experiencing satisfaction with researcher community support. This result is in line with the results of a recent study that suggested that doctoral experiences of equal treatment in researcher community support activities contributes to their experience of satisfaction (Löfström & Pyhältö, 2019). The results on various support forms has been corroborated by previous studies that showed the relationship between doctoral students receiving emotional support and their perseverance (Bengtsen, 2016a; Ives & Rowley, 2005; Pyhältö et al., 2017; Vekkaila et al., 2016; Wao & Onwuegbuzie, 2011). Also, frequent supervisory support was related to students' experienced satisfaction and matched support. Previous research literature has shown similar results on matched social support experiences in terms of frequency and satisfaction (Martinsuo & Turkulainen, 2011; Max Planck Society, 2017; Pyhältö et al., 2012c; 2015).

Furthermore, the results revealed that insufficient integration into the researcher community was associated with experiences of burnout. Low levels of support and having overall unsatisfactory experiences in the supervisor-supervisee relationship, was associated with an increased risk of burnout. In addition, students' experiences of mismatched support indicated that doctoral students who reported reduced levels of equal treatment within their researcher communities had an increased risk of suffering from burnout. Accordingly, doctoral experiences of being treated equally within their researcher communities decreased the risk of burnout. The results match earlier findings that showed that doctoral students are sensitive to challenges involving experiences of inequality (Löfström & Pyhältö, 2015). In addition, mismatched support in terms of inadequate social support in the supervisory relationship, was related to experiences of burnout. The risk of burnout during the doctoral trajectory had been identified earlier (Peltonen et al., 2017; Vekkaila et al., 2016). In addition, the findings of this study indicated that less frequent supervisory support was related not only to experiences of burnout, but also to entertaining intentions about attrition. The relationship between experiences of burnout and the risk of attrition are corroborated with previous findings (Ali & Kohun, 2007; Hunter & Divine, 2016; Jacobsson & Gillström, 2006; Jairam & Kahl, 2012; Levecque et al., 2017; Lovitts, 2001; Pyhältö et al., 2015). For example, about one-third of Canadian doctoral students (Hunter & Divine, 2016) intended to leave academia due to a lack of wellbeing experiences such as emotional exhaustion (Hunter & Divine, 2016). Likewise, recent research on doctoral wellbeing has suggested that a

significant number of doctoral students suffer from mental health problems (Barry et al., 2018; Levecque et al., 2017; Max Planck Society, 2017; Meijer et al., 2017).

One explanation for the results in this study might be that almost a half the participants (in Part-study II) worked part-time. It might be that they did not have the same opportunities to be integrated into the researcher community than their full-time peers. Their part-time study status might have contributed to them not having the opportunity to receive adequate social support compared to full-time doctoral students. This explanation has been corroborated by earlier research (Corcelles, Cano, Liesa, Gonzáles-Ocampo & Castelló, 2019) that suggested that study status as a factor needs to be borne in mind when interpreting the results of social support in connection to negative outcomes. To summarise, not having the ability to make use of various sources of support in academia, not receiving social support on a frequent basis from the supervisors, and feelings of inequality in the researcher community were related to doctoral students' experiences of burnout during their doctoral study process.

Further investigations on the comparison between Finnish and Danish doctoral students revealed cross-cultural variations in the socially-embedded support system provided by doctoral education (Part-Study III). Similarities between the social support experiences were found in both the Danish and Finnish doctoral educational context regarding students' emphasis on researcher community support over supervisory support. When comparing the two groups of students, the Danish students reported slightly higher levels of researcher community support than the Finnish students did. This is interesting since the participants in Part-study II underlined supervisory support over researcher community support. The explanation for this finding may be that the sample in the doctoral experience survey (Swedish speakers pursuing doctoral studies) differs from the cross-cultural sample, in which Finnish speaking doctoral students were the majority of Finnish participants. The minority language-speaking students (Part-study II) reported that communicating with their supervisor(s) in their native language was highly important. Thus, since they felt comfortable in the supervisor-doctoral student relationship, they might also have assessed addressed supervisory support as being more important than their researcher community support experiences. This clarification explanation is supported by previous findings (Cornér & Lindholm, 2013), one of which showed that most doctoral students (82%) reported that they received supervisory support in their mother tongue, and benefited from it. Still, this study also highlighted that doctoral students express their satisfaction with the support they receive by their researcher community. Hence, the results are aligned with previous findings. Previous results show that doctoral students found that researcher community supports engagement in the learning environment, which further promotes the doctoral study process and the thesis process (Stubb, 2012; Gurr, 2011). The results support earlier research showing that social support from

the whole researcher community plays a major role in doctoral studies (Dysthe et al., 2006; Lee, 2008; Malfroy, 2005; Peltonen et al., 2016; Rigg et al., 2013; Skakni, 2018b).

Additional examination showed that both Danish and Finnish doctoral students feel supported from informational, instrumental and emotional points of view. The Danish and Finnish students similarly reported instrumental support as the most frequent form of support they received. Therefore, the results indicated that practical and concrete advice and guidance on funding, time allocation, equipment, networks etc. was underlined by the students. But, the result on the highest frequency of instrumental support incidents contradicts earlier results showing that doctoral students have rarely brought up instrumental support (Mantai & Dowling, 2015; Pyhältö et al., 2015; Vekkaila et al., 2016). Furthermore, the least-reported support experience among Danish and Finnish students was emotional support, entailing caring, compassion, listening and a sense of belonging. The results further indicated, that the only form in which the students underlined more matched support than mismatched support was in the form of informational support. Both Danish and Finnish students underlined their satisfaction with the informational support they received in terms of know-how and guidance related to the advice they get to undertake their research tasks. This implies that the form of informational support is most typically identified in the research process. Therefore, the students are usually provided with help which helps them to learn about questions regarding the research process. The results on both student groups' approval of informational support are aligned with earlier research which showed that students consider informational support to be a significant form of support in their research activities (Devos et al., 2015; Hermann et al., 2014; Pyhältö et al., 2012a; 2012b; 2015; Vekkaila et al., 2016).

A difference was detected between the Finnish and Danish students in their researcher community activities in terms of international research collaboration. Doctoral students in Denmark described particularly more experiences of co-authoring with international researchers, participating in international courses, and they also reported that they had benefitted from international research exchange, compared to their Finnish counterparts. The results suggested that Danish doctoral students have better opportunities to utilize international researcher community support. This was due to the required and scheduled international research exchange period context of doctoral education in Denmark. Hence, the Danish doctoral students are provided more spaces and events that will allow them to engage in a wider range of sources of support and within larger networks in their field. Previous research (Dysthe et al., 2006; Pyhältö et al., 2015) has highlighted the significance of broader social support for doctoral students, so that they are offered the opportunity to develop networks in their field, both nationally and internationally.

Finally, the findings on differences in social support experiences between the Danish and Finnish students imply that the Danish students perceived more

informational and emotional support than their Finnish peers. The perceived mismatched support was most frequent in the form of emotional support among Danish students, while the most frequently mismatched support was reported in instrumental support among Finnish students. The results can be understood in terms of differences in the study status of doctoral students and cultural norms embedded in the Danish and Finnish doctoral education systems. The explanation for Finnish doctoral students' emphases on the importance of instrumental support in doctoral studies might be that they also more often reported their study status as being part-time students than their Danish colleagues. It might be that the Finnish students did not have the opportunity to receive as frequent supervision in their doctoral studies as the Danish students. Consequently, the part-time students may have had fewer opportunities to engage in with the researcher community compared to their Danish colleagues who were studying on a full-time basis. The bigger proportion of Danish students reported studying full-time means that they have more favourable circumstances, hence availability to receive more instrumental support. Better funding opportunities and having enough time allocated to them allows students to concentrate on their doctoral work. The experiences of mismatched instrumental support, especially for the Finnish students, are supported in the previous research literature. The research literature indicate that challenges perceived in the study process, such as the lack of access to financial opportunities undoubtedly shape the students' progress in their doctoral studies (Appel & Dahlgren, 2003; Hermann et al., 2014; Pyhälto et al., 2012c; 2015; Sverdlík et al., 2018).

6.3 CONCLUSIONS AND IMPLICATIONS OF THE RESEARCH

This study focused on exploring the social support system provided by the doctoral education from doctoral students' and supervisors' perspectives. Each of the part-studies provided a lens for the system. Accordingly, the study provided new knowledge on the social support system provided by doctoral education.

First, this dissertation utilized an integrative model for studying doctoral students' social support by drawing on the Researcher Community and Supervisory Support-model (Pyhälto, 2018) and the Job-Demands and Resources-model (Bakker & Demerouti, 2007). The model provided a useful tool to better understand the complexity of the nested social support system provided by doctoral education.

Second, the study broadens the scope of studies on doctoral student social support by expanding the investigation into a) the Swedish-speaking language minority, whose experiences of social support in supervision has not been mapped to this extent before and, b) by conducting a cross-country comparison in two Nordic countries.

Third, the results confirmed the findings of previous studies by showing that the social support or lack of it plays a central role in the doctoral experience (Barnes et al., 2010; Jones, 2013; Halse & Malfroy, 2010; McAlpine & Amundsen, 2012; Gurr, 2001). In particular, the quality and quantity of supervisory and researcher community interactions was considered to be important by both the doctoral students and the supervisors. In general, receiving frequent support from multiple sources of support was beneficial for the students. It speaks in favour of utilizing collective forms of supervision. A recent longitudinal study on doctoral students in Sweden suggests that students receiving collective supervision in the first year of the doctoral studies significantly out-perform those receiving individual supervision (Agne & Mörkenstam, 2018). The results imply that doctoral programs would benefit from utilizing the whole spectrum of the social support system provided by the researcher community ranging from networks including fellow doctoral students working at the same centre to international disciplinary networks, in order to promote student learning. Also, the networks beyond the doctoral students' home institution can be considered important, especially in terms of their employment after earning the degree. The supervisors' and the doctoral students emphasized both in-house and external collaborative support practices. This is in line with earlier findings showing that social support from the whole researcher community benefit the doctoral studies (Dysthe et al., 2006; Lee, 2008; Malfroy, 2005; Peltonen et al., 2016; Rigg et al., 2013; Skakni, 2018b).

Fourth, the results suggested that the doctoral students may benefit from receiving a range of forms of social support (see also Dysthe et al., 2006; Lee, 2008; Malfroy, 2005; Peltonen et al., 2017; Rigg et al., 2013), but particularly more instrumental and emotional support. The results highlighted that the support provided should fit the need, and further showed that there were both individual, and socio-contextual variations in this regard. This implies that providing social support is necessary, but not enough for a well-functioning support system in doctoral education. Accordingly, students' support needs must be identified in order to provide sufficient support. Investing in the development of support practices in doctoral schools and doctoral programs is likely to have far reaching positive effects.

Fifth, reported challenges related to social support, including the lack of or inadequate support were related to increased risk of burnout, reduced levels of satisfaction and further increased risk of attrition. This implies that by providing enough support, both doctoral students' wellbeing and study completion could be enhanced, things that would be highly beneficial for both the student and the university (Jones, 2013; Malfroy, 2005; Pyhältö et al., 2009; Sala-Bubaré & Castelló, 2017; Vekkaila et al., 2016). However, it might be that the doctoral students who need most help are the ones who least seek help. This implies that developing organizational structures that enhance collective support practices (Jones, 2013; Malfroy, 2005; Pyhältö et al., 2009; Sala-Bubaré & Castelló, 2017; Vekkaila et al.,

2016) can cease emotional exhaustion experienced by the students and increase satisfaction. Accordingly, proactively investing in developing the social support system of doctoral education would simultaneously profit both doctoral students' learning and their wellbeing. Proactive support might help the student to overcome challenges in the early stages and to feel more satisfied in their daily work in order to continue the doctoral project.

Sixth, the results highlighted the importance of researcher community support for the doctoral experience. Accordingly, students benefit from being involved in research networks in their field, and in their progression to become an academic expert, during their doctoral journey (Castelló et al., 2017). Working closely together may be a dynamic pedagogy in managing uncertainty and fostering internal validation, e.g. self-belief (Mantai & Downson, 2015) and in helping the doctoral students to cope with unforeseen challenges. Nevertheless, doctoral students are a select group of people within the academic community. Therefore, it is also the students' own responsibility to act as active relational agents (Pyhältö & Keskinen, 2012), including taking an active stance in their own research project (Löfström & Pyhältö, 2015) and proactive engagement in their researcher community. Yet, collaborative practices in the researcher community stand as an important factor in the promotion of each student's relational agency (Pyhältö & Keskinen, 2012). Therefore, it is recommended that the students be recognized as active members in the community from the beginning of their studies.

Seventh, supervisors identified various resources and challenges at the different levels of the nested social support system provided by the doctoral education. This implies that supervisors perceived doctoral education as a complex social support system. This provides a starting point for utilizing the resources and overcoming the challenges. Yet this cannot be left solely as the supervisors' responsibility. The supervisors view doctoral supervision as a substantial responsibility and they often attempt to solve problems on their own (Vehviläinen & Löfström, 2014; Strandler et al., 2014). Yet, it is also known that the supervisor – supervisee relationship can be challenging for the supervisor (Jones, 2013; Lee, 2018; Pyhältö et al., 2012c; Vehviläinen & Löfström, 2014). Therefore, supervisors themselves also need support in order to promote doctoral student trajectories successfully. There are several potential sources for such support, including colleagues, supervisory training, mentoring and supporting doctoral education policies and practices provided by the institutions. However, in order to be functional, it is equally important that the support provided for the supervisors is built into the support needed. In this regard, it seems that there is still work to be done, as a recent large scale survey (over 300 universities across Europe participated) showed that about a third (35%) of the universities did not offer training for supervisors (European University Association, 2019).

Finally, the results highlighted the importance of social support at the micro level of doctoral education interactions. Even though supervisory and researcher community support are central determinants of a positive doctoral experience, they cannot solely be explained by looking at what is done at the micro level in the socially-embedded nested system of social support. National and international doctoral education policies, institutional structures and practices also matter. Accordingly, overcoming possible structural silos and gaps, e.g. recognizing and adjusting the balance between resources and challenges at the different levels of the university organization provide institutions with an opportunity to make more efficient use of the resources, and deal with challenges at the appropriate level. Simultaneously, this also allows the challenges to be tackled proactively, and thus will prevent them from transferring from one domain to another. This calls for building alignment between the macro policies and the social activities provided by the micro level researcher community.

6.4 FUTURE RESEARCH

This study explored resources and challenges in doctoral education from the micro level perspective, from doctoral supervisors and doctoral students. Future directions for research in the area could examine resources and challenges embedded in doctoral education as seen from the macro level, for example from a policy making view. In parallel, it would be important to investigate how resources and challenges are perceived from an administrative perspective, for example, administrative experts' perceptions of supporting doctoral students in doctoral schools. By further investigation of resources and challenges at different systemic levels in the doctoral learning environment, it would be possible to complement our knowledge on resources associated with social aspects in doctoral education and challenges embedded in the institutional environment of doctoral education. The supervisors also reflected on academic language and writing skills as a central competence for successful study completion. Since oral and research writing skills constitute a dual role as part of scholarly expertise, learning and the means to report research (Castelló, Iñesta, & Corcelles, 2013; Florence & Yore, 2004; Iñesta & Castelló, 2012; McAlpine, 2017) in future studies, it might be interesting to explore the topic in more detail.

Moreover, this research acknowledges the relationship between unequal treatment within their researcher communities and increased risks of burnout. It would be important and noteworthy to undertake a longitudinal study on the development of burnout symptoms in doctoral students, and how the students cope with such experience over a longer period. Furthermore, a conclusion to be made against the finding in this study is that even though both the Danish and Finnish

doctoral students felt well supported, in the open-ended questions they expressed general dissatisfaction with the kinds of support they received or frustration with the lack of support needed. This could mean that the different forms of support needed, and the social support provided, do not completely match the needs of the individual student. Therefore, we need more research-based knowledge on the different kinds of support, and on new forms of support. For example, a self-directed online social support platform could deliver recommendations to students as to where they can find the support, they think they need. An online tool could deliver targeted data information on doctoral students' experiences of their need and preferences for social support. Social support online could be seen as an integrated tool in a holistic system of social support. By using web-based applications, the next generation of supervision pedagogy that answers some of the needs of doctoral students could be promoted (Maor, Ensor & Fraser, 2016).

Finally, future research could include the fourth component of support dynamics within academia suggested by the Researcher community and Supervisory support model (cf. Pyhältö, 2018). Investigating mutual interaction and whether social support from a specific giver has a positive impact on the receiver (Cohen & Syme, 1985) would add important insights on the complex processes embedded in doctoral student learning in becoming an academic expert.

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APPENDICES

Appendix 1.

Interview protocol (Part-study I)

Employment:

Discipline:

I have been supervising doctoral students since (year):

Number of current supervisees (incl. doctoral students who are conducting their thesis outside the university):

I have been supervising mostly monographs/article based dissertations?

I have been supervising mostly dissertations written in English/Finnish/Swedish/other language(which)?

I have been supervising (number) dissertations during the years 2003 – 2013?

I The beginning of the process and supervision

1. How does the process usually start? How do you choose your supervisee?
2. What issues are important to concentrate on in the supervision process at the beginning of the doctoral study process?
3. In your opinion, what is the most important task for a supervisor?
4. In your opinion, what are the requirements for a supervisor in doctoral education
5. A. Could you give examples of the factors that are enhancing for doctoral students in their studies?
B. Could you give examples of the factors that are challenging for doctoral students in their studies?
6. Do you have suggestions about how the supervision process could be developed in the university?

II The doctoral study process and the development of doctoral student competence

7. Which competences (doctoral students) are important in your discipline?
8. What kind of courses in enhancing doctoral student competences should, in your opinion, be more broadly offered to the doctoral students?
9. What is, in your opinion, the current situation for courses offered in Swedish?
10. How should and how can courses offered in Swedish for doctoral students be developed?
11. How well do you think that the doctoral students manage the research terminology in Swedish in your discipline?
12. How would you grade the doctoral students language competence (1 = poor, 5 = excellent)?
13. Do you as a supervisor encourage your doctoral students to go abroad on a research exchange?

III Carrier planning

14. How do you ensure the academic regrowth within your discipline?
15. A. Do you as a supervisor discuss the future career possibilities with your doctoral students?
B. Do you as a supervisor discuss their intresst for a future career within academia with your doctoral students?
16. Is there someting you would like to add/ to tell?

Appendix 2.

The Doctoral Experience Survey (Part-study II)

PhD student survey

The aim of this survey is to collect data on how you view your doctoral studies and your future career options.

Motive for doctoral studies

1) Which factors have affected your motivation to engage in doing a doctoral degree?

(1=not important... 5= very important)

	1	2	3	4	5
My interest in a particular research topic	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My interest in research in general	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A natural continuation of previous studies or work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Encouragement from the academic staff at Hanken	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Encouragement by the employer or an expert outside Hanken	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Obtaining qualifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Professional development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improved career prospects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Improved professional status	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Higher salary	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coincidence, no other career prospect in sight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I aimed for a doctoral degree already when I started university	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Got interested in the research topic when writing my MSc thesis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Any other factors you would like to mention?

2) Please name the factors that have contributed to the progress of your doctoral studies and doctoral dissertation.

3) Please name the factors that have hindered the progress of your doctoral studies and doctoral dissertation.

Supervision

A degree supervisor is appointed for every student admitted to the xxx PhD programme.

4) Who supervises your postgraduate studies and doctoral dissertation?

- ☐ One appointed supervisor
- ☐ Several appointed supervisors/a supervisory group
- ☐ I have no supervisor
- ☐ I don't know
- ☐ Someone else

If you answered someone else, please specify

5) Please assess the significance of the following for the supervision of your postgraduate studies and dissertation.

(1=not important... 5= very important)

	1	2	3	4	5	Not applicable
First/main supervisor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Co-supervisor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The other members of the supervisory group	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Support/follow-up/advisory group	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other doctoral students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other members of my research group	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Someone else, please specify

6) How often do you receive supervision by your supervisor/s?

- ☐ Daily
- ☐ Weekly
- ☐ Once a month
- ☐ Once every two months
- ☐ Once every six months
- ☐ Less frequently

7) Have your supervisors changed in the course of your doctoral studies?

- ☐ Yes, of my own initiative
- ☐ Yes, for some other reason
- ☐ No, but I have not considered changing supervisor/s
- ☐ No, and I have not considered changing supervisor/s

If you have changed or considered changing your supervisors, why?

8) The following section concerns supervision and the conditions of doctoral education.

For each statement, please choose the alternative that best describes your situation. (1=fully disagree... 5= fully agree).

	1	2	3	4	5
I often receive constructive criticism for my skills and expertise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My expertise is put to use in the research community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that I am treated with respect	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that the other members of the research community appreciate my work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I receive encouragement and personal attention from my supervisor/s	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that my supervisor/s are interested in my opinions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The relationships between doctoral students are marked by competition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel accepted by the research community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel appreciated by my supervisor/s	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There is a good sense of collegiality between researchers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel like an outsider in my research community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I can discuss openly any problems related to my doctoral studies with my supervisor/s	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rights and responsibilities are equally distributed between me and the other doctoral students in my immediate surroundings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I receive encouragement and support from the other doctoral students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My research community addresses problems in a constructive way	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have been bullied during my doctoral studies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am treated equally	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I can influence matters concerning doctoral education in my research community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have at my disposal the facilities and equipment I need	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supervision has been based on the general guidelines for the supervision of research and studies issued by the doctoral programme	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9) Are you satisfied with your supervision?

- ☐ Yes
☐ No

If no, please explain why

10) How would you improve the supervision of doctoral studies?

Research collaboration/Internationalisation

11) For each statement, please choose the alternative that best describes your situation. (1=not at all... 5=to a great extent/very often)

	1	2	3	4	5
In the course of my doctoral studies I have done research in cooperation with other researchers in Finland	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have participated in international scientific conferences	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have done co-authored publications with other researchers from other Finnish Universities/other research institutions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In the course of my doctoral studies I have done research in cooperation with researchers abroad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
During my doctoral studies I have participated in international summer schools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have participated in domestic scientific conferences	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have co-authored publications with other researchers from abroad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12) During your doctoral studies, have you spent some period of time studying at another institution?

- ☐ Yes, in Finland
- ☐ Yes, abroad
- ☐ No

If yes, how many months in Finland and how many months abroad?

Studies

13) The availability of doctoral courses in your area of study is
(1=not at all sufficient... 5=fully sufficient)

1	2	3	4	5
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14) How would you rate your skills in the following languages?
(1=very weak... 5=excellent)

	1	2	3	4	5
Finnish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Swedish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
English	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Which other languages do you know?

Please just list the languages.

15) How would you like to develop the doctoral education?

16) Please assess the level of your satisfaction with your doctoral education.

(1= very dissatisfied... 5= very satisfied)

1 2 3 4 5

☐ ☐ ☐ ☐ ☐

17) Have you considered withdrawing from your doctoral studies?

☐ Yes

☐ No

If yes, please state the reasons.

Professional career

18) If you plan to pursue an academic career, are you mainly interested in teaching or in research?

Select one only.

☐ Mainly in teaching

☐ Both, but mainly in teaching

☐ Both, but mainly in research

☐ Mainly in research

☐ I am not interested in an academic career

19) In what other areas of professional life would you consider to continue your career after the doctorate?

☐ In the field of teaching and education

☐ In managerial or consulting positions in industry or business

☐ In public administration or service

☐ As an entrepreneur (e.g. by establishing a company of your own)

☐ Other

If you chose 'Other', please elaborate:

Wellbeing

20) Do you worry about being unemployed when your doctoral studies are completed?

☐ Yes

☐ No

The next question concerns stress. Stress is defined as a situation in which a person feels tense, restless, nervous, or anxious, and/or has difficulty sleeping because his/her mind is troubled all the time.

21) Have you recently experienced stress?*(1=not at all, 5=to a great extent/very often)*

1

2

3

4

5

☐

☐

☐

☐

☐

22) For each of the following statements, please choose the alternative that best describes your situation (1=I do not agree at all, 5= I totally agree).

	1	2	3	4	5
I feel exhausted.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My workload is often too high.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Doctoral studies are too stressful for me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I worry about the thesis in my free time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I often fear that I will fail in my doctoral studies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am stressed out by the workload, deadlines and competition in doctoral studies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have to force myself to work on my thesis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is difficult for me to find meaning and purpose in my doctoral studies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am not motivated by the content of my studies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Background information

Gender

- ☐ Female
- ☐ Male

Age

- ☐ under 25
- ☐ 25 - 29
- ☐ 30 - 34
- ☐ 35 - 39
- ☐ 40 - 44
- ☐ 45 - 49
- ☐ 50 or over

Do you have children?

- ☐ Yes
- ☐ No

Department

Majorsubject

Year of receiving the right to pursue doctoral studies at xx

Year of starting the doctoral studies

Estimated year of completing the doctorate

Do you carry out paid work alongside your doctoral studies?

- ☐ Yes, full time
- ☐ Yes, part-time
- ☐ No

How have you funded your doctoral studies?

- ☐ Doctoral programme position funded by the Academy of Finland/the Ministry of Education and Culture
- ☐ Other full-time employment at Hanken
- ☐ Personal grant
- ☐ Project funding
- ☐ Student financial aid
- ☐ Employment outside Hanken
- ☐ Other forms of funding
- ☐ Other part-time employment at Hanken

For each alternative, please indicate their duration in months. Also, if you checked 'Other forms of funding', please indicate which

My dissertation will be in the form of

- ☐ A monograph
- ☐ An article/essay thesis
- ☐ I don't know yet

The language of my dissertation is

- ☐ Finnish
- ☐ Swedish
- ☐ English
- ☐ Other If you checked other, please indicate which.
- ☐ Multiple languages

If you have any feedback on the survey or comments on the questions, please leave them in the box below.

Appendix 3.

Cross-Cultural Doctoral Experience Survey (Part-study III)

Think about the wholeness of your doctoral studies while answering the questionnaire

Evaluate the following statements about your interest in doctoral studies. I'm doing doctoral studies because...	1(=strongly disagree) ... 7(=fully agree)						
I am inspired by my research topic.	1	2	3	4	5	6	7
I want to get a better position.	1	2	3	4	5	6	7
I enjoy intellectual challenges.	1	2	3	4	5	6	7
I want to work in a research community.	1	2	3	4	5	6	7
I want to get a better salary.	1	2	3	4	5	6	7
I want to develop my skills.	1	2	3	4	5	6	7
I want to have a doctoral degree.	1	2	3	4	5	6	7
Finding out new things is fascinating.	1	2	3	4	5	6	7
After graduating I want to get a post-doc at a university.	1	2	3	4	5	6	7
I want to develop myself.	1	2	3	4	5	6	7
I want to complete what I started.	1	2	3	4	5	6	7
My research is useful for others.	1	2	3	4	5	6	7
Degree is required in my future work.	1	2	3	4	5	6	7
I did not have other career prospects in sight.	1	2	3	4	5	6	7
I want to contribute to my field of research.	1	2	3	4	5	6	7
My job prospects are better after doctoral degree.	1	2	3	4	5	6	7
I am inspired by the work as researcher.	1	2	3	4	5	6	7
Some other reason, please specify.	1	2	3	4	5	6	7

Doctoral journey turning points (positive and negative)

Doing doctoral research entails different kind of events and turning points, both positive and negative.

Describe the most positive experience by completing the following sentences

The most positive event or experience from the beginning of my doctoral journey until now was when...

This event or experience was important to me because...

At that time I felt...

Mark the positive experience on the timeline

1. year of doctoral studies 2. year of doctoral studies 3. year of doctoral studies 4. year of doctoral studies 5. year of doctoral studies 6. year of doctoral studies 7. year of doctoral studies 8. year of doctoral studies 9. year of doctoral studies 10. year or more of doctoral studies

Describe the most negative experience by completing the following sentences

The most negative event or experience from the beginning of my doctoral journey until now was when...

This event or experience was important to me because...

At that time I felt...

Mark the negative experience on the timeline

1. year of doctoral studies 2. year of doctoral studies 3. year of doctoral studies 4. year of doctoral studies 5. year of doctoral studies 6. year of doctoral studies 7. year of doctoral studies 8. year of doctoral studies 9. year of doctoral studies 10. year or more of doctoral studies

Research environment, supervision and collaboration

Who supervises your thesis?
One supervisor
Two or more supervisors
I have no supervisor
Someone else, please specify?

How often do you receive supervision?
Daily
Weekly
Once a month
Once every two months
Once every six months
Less frequently

In your opinion what is good supervision? Give an example about a good supervision situation.
What kind of supervision you would like to have?

Rate the following statements about your research community and supervision.	1(=strongly disagree) ... 7(=fully agree)						
I receive supervision when I need it.	1	2	3	4	5	6	7
I often receive constructive criticism.	1	2	3	4	5	6	7
I can negotiate about central choices regarding my dissertation with my supervisors.	1	2	3	4	5	6	7
I have been left without supervision at some point during my doctoral studies.	1	2	3	4	5	6	7
My expertise is put to use in the research community.	1	2	3	4	5	6	7
My dissertation reflects the choices of my supervisors rather than my own choices.	1	2	3	4	5	6	7
I feel that I am treated with respect.	1	2	3	4	5	6	7
I feel that the other members of my research community appreciate my work.	1	2	3	4	5	6	7
I receive encouragement and personal attention from my supervisors.	1	2	3	4	5	6	7
I feel that my supervisors are interested in my opinions.	1	2	3	4	5	6	7
My supervisors regard it important that everybody who is mentioned as an author in an article or similar, actually has contributed sufficiently.	1	2	3	4	5	6	7
The relationships between doctoral students are marked by competition.	1	2	3	4	5	6	7
I feel accepted by my research community.	1	2	3	4	5	6	7
If my supervisors cannot advise me I am usually left without help.	1	2	3	4	5	6	7
There is a good sense of collegiality among the researchers I interact with.	1	2	3	4	5	6	7
My supervisors encourage me to explore alternative viewpoints in my research.	1	2	3	4	5	6	7
I feel like an outsider in my own research community.	1	2	3	4	5	6	7
I can openly discuss any problems related to my doctoral education with my supervisors.	1	2	3	4	5	6	7
I can tell my supervisor if a personal matter affects my work with the dissertation.	1	2	3	4	5	6	7
Rights and responsibilities between me and the other doctoral students in my immediate surroundings are equally distributed.	1	2	3	4	5	6	7
I receive encouragement and support from the other doctoral students.	1	2	3	4	5	6	7
I feel that my supervisors appreciate my work.	1	2	3	4	5	6	7
I have learned to hide viewpoints that differ from those of my supervisors.	1	2	3	4	5	6	7
My supervisors encourage doctoral students to collaborate with each other.	1	2	3	4	5	6	7
My supervisor favors some of the doctoral students.	1	2	3	4	5	6	7
My research community addresses problems in a constructive way.	1	2	3	4	5	6	7
I feel that my supervisor has exploited my thoughts or	1	2	3	4	5	6	7

products in an unfair way.							
I have been bullied during my doctoral education.	1	2	3	4	5	6	7
I am treated equally in my research community.	1	2	3	4	5	6	7
The progress of my dissertation is hindered by the fact that my supervisors make me do the work of others' in the research group.	1	2	3	4	5	6	7
I can influence matters concerning doctoral education in my research community.	1	2	3	4	5	6	7
My supervisors treat the doctoral students in a fair way.	1	2	3	4	5	6	7
My supervisors express critical comments on my research in a friendly manner.	1	2	3	4	5	6	7

Satisfaction with your supervision	
Are you satisfied with your supervision?	1(=unsatisfied) ... 7(=completely satisfied)
	1 2 3 4 5 6 7
Please state the reasons.	

Have you changed the main supervisor of your dissertation in the course of your doctoral studies?
Yes/No
If yes, please state the reason.
Have you considered changing the main supervisor of your dissertation?
Yes/No
If yes, please state the reason.

What best represents how you go about your research?
Mainly on my own
Mainly in a research team or teams
As much on my own as in research team or teams

Do you have an appointed follow-up group?	yes	no					
Have you already met with your follow-up group?	yes	no					
If yes, did you find follow-up meetings useful?	1(=not at all) ... 7(=highly usefull)						
	1	2	3	4	5	6	7

The following statements concern your national and international researcher collaboration from the beginning of your doctoral studies.	yes/no
I have presented at national conferences.	
I have co-authored papers with international researchers.	
I have participated in international courses or summer schools.	
I have presented at international conferences.	
I have participated in researcher exchange during my doctoral studies.	

Academic Writing

Rate the following statements about your academic writing experience.	1(=strongly disagree) ... 7(=fully agree)						
I often postpone writing tasks until the last moment.	1	2	3	4	5	6	7
Writing is a creative activity.	1	2	3	4	5	6	7
I find it difficult to write, because I am too critical.	1	2	3	4	5	6	7
My previous writing experiences are mostly negative.	1	2	3	4	5	6	7
I write regularly regardless of the mood I am in.	1	2	3	4	5	6	7
I produce a large number of finished texts.	1	2	3	4	5	6	7
Without deadlines I would not produce anything.	1	2	3	4	5	6	7
I sometimes get completely stuck if I have to produce texts.	1	2	3	4	5	6	7
I find it difficult to start writing.	1	2	3	4	5	6	7
I find it easier to express myself in other ways than writing.	1	2	3	4	5	6	7
I only write when the situation is peaceful enough.	1	2	3	4	5	6	7
The skill of writing is something we are born with; it is not possible for all of us to learn it.	1	2	3	4	5	6	7
I find it difficult to hand over my texts, because they never seem complete.	1	2	3	4	5	6	7
I start writing only if it is absolutely necessary.	1	2	3	4	5	6	7
I hate writing.	1	2	3	4	5	6	7
I am a regular and productive writer.	1	2	3	4	5	6	7
I could revise my texts endlessly.	1	2	3	4	5	6	7
I write whenever I have the chance.	1	2	3	4	5	6	7
Writing is a skill which cannot be taught.	1	2	3	4	5	6	7
Writing is difficult because the ideas I produce seem stupid.	1	2	3	4	5	6	7
Writing often means creating new ideas and ways of expressing oneself.	1	2	3	4	5	6	7
Writing develops thinking.	1	2	3	4	5	6	7

Experiences of doctoral research

Rate the following statements about your engagement in your doctoral research.	1(=strongly disagree) ... 7(=fully agree)						
When I conduct my doctoral research, I feel that I am bursting with energy.	1	2	3	4	5	6	7
I find the doctoral research that I do full of meaning.	1	2	3	4	5	6	7
Time flies when I'm doing my doctoral research.	1	2	3	4	5	6	7
When doing my doctoral research, I feel vigorous.	1	2	3	4	5	6	7
I am enthusiastic about my doctoral research.	1	2	3	4	5	6	7
When I am doing my doctoral research, I forget everything else around me.	1	2	3	4	5	6	7
My doctoral research inspires me.	1	2	3	4	5	6	7
I feel happy when I start working on my doctoral research.	1	2	3	4	5	6	7
I am immersed in my doctoral research.	1	2	3	4	5	6	7

Rate the following statements about your experience of strain within doctoral research.	1(=strongly disagree) ... 7(=fully agree)						
I feel overwhelmed by the workload of my doctoral research.	1	2	3	4	5	6	7
I feel my doctoral dissertation is useless.	1	2	3	4	5	6	7
I often have feelings of inadequacy in my doctoral research.	1	2	3	4	5	6	7
I often sleep badly because of matters related to my doctoral research.	1	2	3	4	5	6	7
I feel that I am losing interest in my doctoral research.	1	2	3	4	5	6	7
I feel burned out.	1	2	3	4	5	6	7
I have difficulties in finding any meaning to my doctoral dissertation.	1	2	3	4	5	6	7
I brood over matters related to doctoral research a lot during my free time.	1	2	3	4	5	6	7
I used to have higher expectations of my doctoral research than I do now.	1	2	3	4	5	6	7
The pressure of my doctoral dissertation causes me problems in my close relationships with others.	1	2	3	4	5	6	7
I often feel that I fail at my doctoral research.	1	2	3	4	5	6	7

Stress means feeling nervous, uneasy, distressed or having difficulties sleeping because of things that are bothering you.	1(=not at all) ... 7(very often)						
Do you have such feelings?	1	2	3	4	5	6	7

Evaluate the doctoral training you have received according to your own experiences

How well have your doctoral studies responded to your needs							
The courses provided by the UniOGS are in line with my needs.	1(=strongly disagree) ... 7(=fully agree)						
	1	2	3	4	5	6	7
The courses provided by the doctoral programme are in line with my needs.	1	2	3	4	5	6	7
The courses provided by the Faculty/major are in line with my needs.	1	2	3	4	5	6	7

What kinds of courses would be most useful for you?

Following statements concern instructions and practices of UniOGS doctoral school.	1(=strongly disagree) ... 7(=fully agree)						
The instructions and forms related to doctoral studies are easily available	1	2	3	4	5	6	7
The instructions and forms related to doctoral studies are clear	1	2	3	4	5	6	7
Guidance and help related to doctoral studies is available, if needed	1	2	3	4	5	6	7
I know, what to do (e.g. from whom to ask advice), if I face problems in my doctoral studies	1	2	3	4	5	6	7

Have you considered dropping out of your doctoral studies?
Yes/No
If you have considered dropping out, please state the reasons.

Satisfaction with doctoral studies							
Are you satisfied with your doctoral studies?	1(=unsatisfied) ... 7(=completely satisfied)						
	1	2	3	4	5	6	7

How would you develop doctoral education?

Career plans after doctoral degree

What kind of work would you like to do after earning the doctoral degree?

I am interested in academic career (in the university or in the research institution)

yes no

If you plan to pursue an academic career, are you mainly interested in teaching or research?
Please, choose only one of the following options.
Mainly in teaching
Mainly in research
Both, but mainly in teaching
Both, but mainly in research

Background information

Gender
Female
Male

Age
under 25
25-29
30-34
35-39
40-44
45-49
50 or over

First language
English
Other, please specify

Have you any children?
Yes
No

What is your country of origin?
--

Year of enrolment in doctoral studies?

When did you start your doctoral studies?

Estimated year of graduation?

At the moment, I am completing my doctorate
Full-time
Part-time

Principal source of income during doctoral studies	How many months did the funding last?
A doctoral student post at the doctoral program/ faculty	
Other employment at the university	
A personal grant	
Project funding	
No funding	
Work outside university	
Some other form of funding, please specify	
Have you received any help in applying funding for your doctoral studies? yes/no	
If yes, what kind of help you have received?	

My dissertation will be in the form of
Monograph
Summary of articles
If you are doing your dissertation in the form of summary of articles, how many articles will your dissertation include?
I don't know

Have you already published research?	In a peer-reviewed journal or book	In a non peer-reviewed journal or book
Yes/ No		
If yes, how many publications you		

have:		
As a first author		
Not as a first author		

The language of my dissertation is
English
Other, please specify

Appendix 4.

Doctoral students' perceptions of the significance of different actors in the supervision process: means and standard deviations (1=fully disagree, 5=fully agree).

Central actors in supervision	Mean	(SD)
First supervisor	4.17	1.106
Second supervisor	3.51	1.341
Other Ph.D. students	3.46	1.184
Other members in the research group	3.37	1.292
Other members in the supervision group	2.74	1.361
Support/assessment group	2.19	1.253

Appendix 5.

A summary of the multiple regression analyses with study-related burnout as the dependent variable ($R^2=.251$, $R^2_{adj}=.220$, $n= 248$)

Variables	B	SE(B)	t	Sig. (p)
Source of supervision	.165	.102	2.637	.009**
Frequency of supervision	-.228	.046	-3.257	.001**
Satisfaction with supervision	-.181	.121	-2.652	.009**
Equality in the research community	-.135	.061	-2.093	.038**
Thesis form	-.192	.105	-3.000	.003**
Consideration of interruption	.354	.103	5.674	.000***

Note.

$R^2=.251$

* $p < .05$, ** $p < .01$, *** $p < .001$.

Appendix 6.

Researcher community, supervisory support and friction, dissertation format, research group status, study-status, attrition intentions and engagement in international research collaboration

Variables	DK		FI		Chi-square/ <i>t</i> statistic
	M	SD	M	SD	
Researcher community support	4.74	1.22	4.46	1.18	$t = -2.08^*$
Supervisory support	5.56	1.27	5.30	1.24	
Frictions	2.14	.90	2.50	.93	$t = 3.44^{**}$
	<i>n</i>	%	<i>n</i>	%	
Dissertation format					$\chi^2 = 5.91^*$
Monograph	64	48.9	72	35.5	
Summary of articles	67	51.1	131	64.5	
Study status					$\chi^2 = 39.66^{**}$
Full-time	122	84.7	107	52.2	
Part-time	22	15.3	98	47.8	
Research group status					
Alone	116	81.7	161	76.3	
Group	7	6.8	10	10.2	
Both	19	13.4	40	35.3	
Drop-out intentions					
Yes	36	25.4	63	31.0	
No	106	74.6	140	69.0	
International research collaboration					$\chi^2 = 4.26^*$
Yes	39	27.5	38	18.2	
No	103	72.5	171	81.8	
Co-authoring with international researchers	39	27.5	38	18.2	
Participating in international courses	96	67.6	90	43.1	$\chi^2 = 20.45^{**}$
Researcher exchange	75	52.8	12	5.8	$\chi^2 = 100.42^{**}$

Note: * $p < .05$, ** $p < .001$

Appendix 7.

Source of social support; Researcher community support and Supervisory support

Form of social support; Emotional support, Informational support, and Instrumental support.

Source of support	DK students	FI students	Total
Variables	f (%)	f (%)	
Researcher community support	179 (81)	240 (69)	419 (73)
Supervisory support	43 (19)	110 (31)	153 (27)
Total	222 (100)	350 (100)	572 (100)
Social support			
Emotional support	63 (29)	95 (27)	158 (28)
Informational support	76 (34)	102 (29)	178 (31)
Instrumental support	83 (37)	153 (44)	236 (41)
Total	222 (100)	350 (100)	572 (100)

Note: The symbol “f” and the numbers refer to the frequency with which the different kinds of episode were reported.

Appendix 8.

Support fit in the key experiences for Danish and Finnish doctoral students.

Form of support	DK			FI		
	Matched	Mismatched	Total	Matched	Mismatched	Total
Emotional support	<i>n</i> = 26	<i>n</i> = 37	63	<i>n</i> = 46	<i>n</i> = 49	95
	41 %	59 %	100 %	48 %	52 %	100 %
	23 %	34 %	57 %	27 %	27 %	54 %
Informational support	<i>n</i> = 48	<i>n</i> = 28	76	<i>n</i> = 60	<i>n</i> = 42	102
	63 %	37 %	100 %	59 %	41 %	100 %
	42 %	26 %	68 %	35 %	23 %	58 %
Instrumental support	<i>n</i> = 40	<i>n</i> = 43	83	<i>n</i> = 64	<i>n</i> = 89	153
	48 %	52 %	100 %	42 %	58 %	100 %
	35 %	40 %	75 %	38 %	49 %	87 %
Total	114	108	222	170	180	350
	100 %	100 %	100 %	100 %	100 %	100 %